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HARVARD UNIVERSITY



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NUMBER 1

NATIONAL FLOWERS

FROM time to time we hear of the "national" flowers of various European countries, but it is surprising to find that there are none of these "national" flowers officially accepted by the national governments. There have been various methods used for selecting "national" flowers, so that hoped for official recognition would lend considerable weight to such selections, but unfortunately this is lacking in most cases. Consequently we must rely on various polls and other selective methods for information, and there are many interesting stories connected with certain flowers which have been popularly chosen.

For instance, the rose has been greatly admired by the people of England since the reign of Edward IV (1461-1483) when it made its first appearance upon the great seal of England. Shakespeare told of a quarrel in the old temple garden between the Duke of York and the Earl of Somerset. Finding that their followers were becoming very excited, the Duke suggested that they "shall in dumb significance" proclaim their thoughts, adding:

"Let him who is a true born gentlemen,
And stands upon the honor of his birth,
If he supposes I have pleaded truth,
From off this briar pluck a white rose with me."

To which the Earl replied:

"Let him who is no coward nor no flatterer,
But dares maintain the party of the truth,
Pluck a red rose flower from this briar with me."

This quarrel lasted thirty years and is referred to now as the War of the Roses. At the end of this thirty-year period a Princess of York

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married a Prince of Lancaster, and so the roses were united. One of the roses used in gardens today was named to commemorate this great occasion. It is called the Rose of York and Lancaster, for its flowers are partly red and partly white. Legend has it that this rose originated at the end of the bloody War of the Roses.

Mention is often made of the cornflower (*Centaurea cyanus*) as the national flower of Germany. In German history it is associated with the beautiful Louise of Prussia, who was the mother of William, the first Emperor of Germany (1871-1888). It is said that during the battle of Jena and Auerstadt, Queen Louise was forced to make her escape from Berlin with her two sons, the older of whom was about nine years old. On the way to Koenigsberg their carriage broke down, and they were obliged to alight and wait by the roadside until the damage was repaired. The Queen mother put her arms about each small boy and endeavored to divert them by calling their attention to the great number of beautiful "Kornblumen" that were growing nearby. "Go," she said, "and gather some of these flowers, and I shall make a wreath and crown you king." Forgetting their troubles, the little fellows ran off and soon picked many blossoms. The Queen then made a wreath from the flowers and placed it on the head of her oldest son. Little William, not to be outdone by his older brother, begged his mother to make one for him, which she did. In placing this wreath on her son's head, she said, "Crowns mean very little sometimes." Before the close of the century that little boy was crowned Emperor of United Germany. Needless to say, he always loved the "Kornblumen," because they reminded him of that pleasant time with his mother when he was a child.

The Fleur de Lis (Fleur de Louis), the white iris, was historically the national flower of France since the time of Philippe le Bel, and King Saint Louis (1214-1270) wanted it to be the emblem of purity. But the flower was the emblem of monarchy for it had appeared on the crest of the royal family, and so could not be used by the Republic.

Although the Italian legislative assembly has never chosen a flower to represent their country, the people have selected the marguerite (*Chrysanthemum frutescens*), because it bears the name of the first Queen of Italy, Margherita di Savoia.

In Norway the "Roslyng" (*Calluna vulgaris*) has been generally considered the national flower. It is not only of value for its lovely summer blossoms, but it is able to withstand the very poor soil conditions and at the same time be perfectly hardy.

The flower most dear to Swedish hearts is *Linnaea borealis*, for it is

named in honor of the world famous Swedish botanist, Linnaeus. Another flower which is very popular in that country is *Chrysanthemum leucanthemum* (in Swedish "prastkrage"), and the Swedish people use it a great deal in their home decorations. This is the oxeye daisy, a native of Europe, which has become a weed in certain parts of the eastern United States. The bright yellow centers of these daisies make them excellent for use in combination with blue flowers on patriotic occasions, for blue and yellow are the Swedish national colors.

In Denmark the clover is considered the most characteristic flower, and the beech tree (*Fagus sylvatica*) the most frequently mentioned in Danish poetry.

The common rue (*Ruta graveolens*), a symbol of virginity and purity, has often been considered the Lithuanian national flower. The Lithuanian vestal virgins who guarded "the eternal sacred fire" always wore wreaths of rue upon their heads.

The tulip is generally accepted as being the most representative of the Netherlands, since it is highly probable that proportionately more tulips are grown in the Netherlands than in any other country in the world.

The shamrock is considered the world over as the popular representative of Ireland. The interest in *Trifolium repens* (or *T. minus*) centers around the early days of the mission of the great Saint Patrick (about 432). One day he was preaching in the neighborhood of the County of Meath in an attempt to explain the doctrine of Trinity to a group who found it most difficult to understand. "How," asked one of the chiefs, "can there be three in one."

Saint Patrick stooped and picked from the sod at his feet a clover leaf. Holding it before them, he said, "Behold, in this trifoliate leaf how three persons in the God-head can exist and yet be one." The generic name of the clover is *Trifolium*, meaning one leaf in three parts. The illustration was so forcible and yet so familiar that the Chief and his whole clan accepted the Christian faith. From this tradition, in all probability, came the adoption in later years of the shamrock as the national emblem of Ireland.

In Scotland the thistle has been traced to the reign of Alexander III and the battle of Largs. In the year 1263 there was a great battle between the Danes and the Scots. The northern invaders under King Haakon succeeded in landing unobserved on the coast of Scotland near the mouth of the Clyde, not far from where Alexander's army was encamped. Under the protection of the night the Danish soldiers crept stealthily toward the Scottish camp, hoping to conquer the Scots

by this surprise attack. Victory seem within their grasp when one of the barefooted Danish soldiers trod upon a thistle. His sharp cry of pain was sufficient to arouse the Scottish soldiers, who in turn fought with such bravery and skill that the Danish invaders were driven from the Scottish shore. Since that time the Scotch thistle, *Onopordum acanthium*, has been considered the national flower of Scotland.

The Welsh people wear the leek on the first day of March in commemoration of Saint David, the patron saint of Wales. White and green, the hues of the leek, are the Cambrian colors.

In Switzerland the edelweiss (*Leontopodium alpinum*) is considered of importance because its natural habitat is in the Alps. Greece claims the violet as its national flower, because it has been mentioned so often by Homer and other writers of the classics. It blooms abundantly in the Isles of the Mediterranean and is constantly seen in the Athenean flower markets. The sunflower, one of the many species of *Helianthus*, is the national flower of Russia, not only because it grows so well but because it is also of great economic importance.

As far as the United States is concerned, a pamphlet was published several years ago by Louis Prang of Boston in which he set forth the respective merits of goldenrod (*Solidago*) and arbutus (*Epigaea repens*) as competitors for the place of honor. He asked for an expression of opinion from the public at that time, and the response was overwhelmingly in favor of the goldenrod. Personally, the writer feels that the goldenrod is very well suited for a national flower not only because of its wide distribution in this country, but also by reason of its scientific name —*Solidago*— which means to make whole or to join. The name alone almost qualifies it as an emblem of our great republic.

Richard J. Hayden
Superintendent of Parks & Cemeteries
Boston, Massachusetts

Note: Mr. Richard J. Hayden, Superintendent of the Boston Parks, has been interested in this subject of national flowers for many years. At one time he contemplated making a garden in which would be represented the national flowers of each country. In order to get official information he wrote to many of the European Consuls and also to several of the European governments for definite information and was very much surprised to find that no government had passed legislation recognizing one as their national flower. The notes contained in this Bulletin are the result of Mr. Hayden's correspondence and are published here for the interest of the gardening public.

OFFICIAL STATE FLOWERS

List compiled by the Wild Flower Preservation Society
Washington, D. C.

Alabama	Goldenrod	Solidago sp.	Legis.	1917
Arizona	Giant Cactus	Cereus giganteus	Legis.	1933
Arkansas	Apple Blossom	Malus sp.	Legis.	1901
California	California Poppy	Eschscholtzia californica	Legis.	1903
Colorado	Colorado Columbine	Aquilegia caerulea	Legis.	1899
Connecticut	Mountain-laurel	Kalmia latifolia	Legis.	1907
Delaware	Peach Blossom	Prunus Persica	Legis.	1895
Florida	Orange Blossom	Citrus sinensis	Legis.	1909
Georgia	Cherokee Rose	Rose laevigata	Legis.	1916
Idaho	Lewis Mockorange	Philadelphus Lewisi	Legis.	1931
Illinois	Native Wood Violet	Viola sp.	Legis.	1908
Indiana	Zinnia	Zinnia elegans	Legis.	1931
Iowa	Wild Rose	Rosa pratincola	Legis.	1897
Kansas	Sunflower	Helianthus annuus	Legis.	1903
Kentucky	Goldenrod	Solidago sp.	Legis.	1926
Louisiana	Southern Magnolia	Magnolia grandiflora	Legis.	1900
Maine	Pine cone & tassel	Pinus Strobus	Legis.	1895
Maryland	Black-eyed Susan	Rudbeckia hirta	Legis.	1918
Massachusetts	Trailing Arbutus	Epigaea repens	Legis.	1925
Michigan	Apple Blossom	Malus sp.	Legis.	1897
Minnesota	Showy Ladyslipper	Cypripedium spectabile	Legis.	1902
Mississippi	Southern Magnolia	Magnolia grandiflora	Schools	—
Missouri	Downy Hawthorn	Crataegus mollis	Legis.	1923
Montana	Bitterroot	Lewisia rediviva	Legis.	1895
Nebraska	November Goldenrod	Solidago serotina	Legis.	1895
Nevada	Sagebush	Artemesia tridentata	Common consent	
New Hampshire	Purple Lilac	Syringa vulgaris	Legis.	1918
New Jersey	Violet	Viola sp.	Legis.	1913
New Mexico	Yucca	Yucca sp.	Schools	—
New York	Rose	Rosa sp.	Schools	1891
North Carolina	Oxeye Daisy	Chrysanthemum leucanthemum	Common consent	
North Dakota	Prairie Rose	Rosa arkansana	Legis.	1907
Ohio	Scarlet Carnation	Dianthus Caryophyllus	Legis.	1904
Oklahoma	Mistletoe	Phoradendron flavescens	Legis.	1893
Oregon	Oregon Hollygrape	Mahonia Aquifolium	Legis.	1899
Pennsylvania	Mountain-laurel	Kalmia latifolia	Legis.	1933
Rhode Island	Violet	Viola sp.	Schools	1897
South Carolina	Carolina Jessamine	Gelsemium sempervirens	Legis.	1924
South Dakota	American Pasqueflower	Pulsatilla hirsutissima	Legis.	1919
Tennessee	Iris	Iris sp.	Legis.	1933
Texas	Texas Bluebonnet	Lupinus subcarnosus	Legis.	1901
Utah	Sego-lily	Calochortus Nuttallii	Legis.	1911
Vermont	Red Clover	Trifolium pratense	Legis.	1894
Virginia	Flowering Dogwood	Cornus florida	Legis.	1918
Washington	Coast Rhododendron	Rhododendron macrophyllum	Legis.	1893
West Virginia	Great Rhododendron	Rhododendron maximum	Legis.	1903
Wisconsin	Native Violet	Viola sp.	Schools	1909
Wyoming	Indian Paintbrush	Castilleja coccinea	Legis.	1917
Hawaii	Hibiscus	Hibiscus Rosa-sinensis	Legis.	1923
Alaska	Forget-me-not	Myosotis sp.	Legis.	1917

Notes: As this goes to press, there are many plants in the Arboretum which are already showing signs of active growth. During the last of March there were many unusually warm days which started early growth in several types of plants. The warm spell was immediately followed by cold rainy days that, fortunately, held things back a bit. The leaf buds of many honeysuckles, barberries, and currants are as far advanced as are those of *Prinsepia sinensis*, which ordinarily is the first of all to start growth in the spring. Some of the willows as seen from the Administration Building are yellowish or reddish-green, sure signs that warm weather must soon come to stay. *Magnolia stellata* is not yet in bloom, and though many of the flower buds have started to split open, they are still sufficiently tight to withstand any cold weather during the next few days. *Rhododendron mucronulatum* is just starting to bloom, while *Viburnum fragrans* has been out for several days, its flower buds being uninjured by the mild winter. *Corylopsis*, *Forsythia*, and *Benzoin* are just ready to open, while *Erica carnea*, protected by a mulch of straw all winter is now in full bloom. *Daphne Mezereum*, *Acer rubrum*, and *Acer dasycarpum* have been in bloom for several days. It is safe to say that there has been practically no winter injury to the trees and shrubs in the Arboretum this winter. If the unusually warm weather of the past week continues, there may be danger from late frosts, but otherwise most of the plants in the Arboretum came through last winter in splendid condition.

Subscription renewals for 1938 are now due. Those who have not resubscribed, please send the subscription price of \$1.00 to the Bulletin of Popular Information, Arnold Arboretum, Jamaica Plain, Massachusetts, at your earliest convenience.

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A RARE AMERICAN SHRUB

ELLIOTTIA RACEMOSA is a rare American shrub or small tree indigenous to a restricted area in eastern and southern Georgia. Because of its rarity, the reference literature is rather meager. Unfortunately, in the little which has been published there appear some misstatements concerning its normal habitat and method of reproduction. The purpose of these notes is to clarify these points. During the past several years the author has had the species under observation at a number of stations. In the course of this study, he has been accompanied on many of his trips by Frank M. Crayton, a nurseryman and plant collector of Biltmore, North Carolina, who is entitled to share any credit that may accrue from these investigations. Acknowledgements are also due Mr. C. D. Beadle of Biltmore, who was a member of a recent expedition and with whose assistance a more thorough study of the plant's method of reproduction was made than had been undertaken up to that time.

Elliottia racemosa is an attractive plant even when not in flower and when in bloom, few native American shrubs can approach it in beauty. Its flowers are pure white, usually with four linear-elliptic petals that are markedly recurved. The racemes, which are always terminal on leafy, fastigiate branches, are rather long, averaging well over six inches. There are several illustrations in the literature but few of these do the plant justice.

The line drawing in Bailey's *Cyclopedia of Horticulture* is good enough in so far as the structure of the flower is concerned, but it fails to give a true picture of the plant in blossom. The petals are actually much more recurved and the racemes much more densely flowered than this illustration indicates. Plants of average size, up to six feet or more in

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height, bear from three to more than twenty racemes and one of the profusely flowered specimens presents an impressive sight indeed. If it were hardy in the north and were readily propagated, *Elliottia* would undoubtedly be one of our most popular shrubs. Unfortunately, its hardiness is questionable and its rarity would make general transplanting out of the question even if it were hardy. It cannot readily be transplanted even in the area where it is native. This is evidenced by the fact that of four specimens that were transplanted from a large station to gardens within two miles during the past three years two promptly died and the remaining two are not thriving well.

While *Elliottia* is one of our rarest shrubs, there is a general impression that it is either nearly extinct or promises soon to become so. This impression can be attributed, in some measure at least, to published statements that are somewhat at variance with the facts.

Investigations indicate that while the plant unquestionably is rare and seems to have disappeared from some areas where it was formerly known to occur there is no occasion to consider it to be in danger of extinction. Also at some stations it appears that there has been no reproduction for many years. However, there are stations where it is propagating itself by seed so that it is definitely not sterile to its own pollen.

At various times during the past several years the author has taken up a number of plants in eastern Georgia. In each case the roots were followed to their very ends and no evidence was found to show that the plant multiplies from its rootstock. In common with many other ericaceous plants, it has shallow horizontal roots that are long and heavy, but, except for rather young plants, they are usually noticeably free from the small fibrous rootlets that are so abundant on the roots of many plants in this family. It does reproduce itself by seed, but to what extent it produces viable seed and whether some such seed is produced annually or only during occasional years is not yet determined. During the past several years it has flowered profusely, but, while the flowers seem to be setting seed as they pass maturity, the vast majority of the fruits abort.

In the fall of 1936 a check of one plant which bore twenty-three flower racemes that averaged over forty flowers each (a total of approximately 1000 individual flowers) showed only eight capsules and not one of these contained a viable seed! Most of the plants that year failed to produce a single fruit. The racemes average fully forty flowers each (more than 80 have been counted on some of them), yet in 1936 a total of only twenty-eight seed capsules were produced by ap-

proximately four hundred racemes; and no seed germination has been reported from any of the material distributed. Seeds were sent to Kew, the Arnold Arboretum, and several individuals in the United States. At several stations no very young plants are in evidence, but in two places at least a fair number of small seedlings less than eight inches high were observed, proof that the plant has produced viable seed within the past few years. Several of these small specimens were lifted, the soil sifted from about their roots, showing no connection with other plants.

Elliottia seems normally to grow with a single trunk, similar to a small tree. However, the area in which it is native is subject to periodical burnings, and if a plant is killed by fire a cluster of sprouts usually arises from the base of the stump. At several stations, as a consequence of this burning, there are whole groups of plants that are of a bushy character. At one large station the plants are mostly of this type, the single-stemmed ones being largely confined to the outer and wetter edges of the area where fire never reaches them. At another station the plants occur at scattering intervals for several hundred yards along the edge of a swamp. Fire seldom, if ever, reaches them, and here they are almost entirely of the "tree" type.

There are several stations in one county in eastern Georgia. All of them that have been investigated are in soil known as Norfolk sand. A survey of the area made by the Bureau of soils, U. S. Department of Agriculture, gives the following information:

"The surface soil of Norfolk sand, to a depth of 6 or 8 inches, consists of loose sand of light gray to dark gray color, changing to light yellowish, the surface being darkened for a few inches by the accumulation of a small amount of organic matter.—The subsoil is of material similar to the soil, in fact there is practically no line of demarcation between soil and subsoil. The subsoil extends to a depth of over 36 inches.—Generally (it) is several feet in depth, in places being as much as 20 feet or more.—The particles forming the sand are subangular grains of quartz, no other material seeming to enter into its formation."

A mechanical analysis given in this survey is as follows:

Fine gravel	2.2%
Coarse sand	19.5%
Medium sand	20.8%
Fine sand	39.9%
Very fine sand	8.6%
Silt	6.0%
Clay	2.5%

Samples of soil taken from about the roots of *Elliottia* at the largest station show a definite acid reaction ranging from pH 5.1 to pH 5.42.

Of the five stations in this neighborhood, three of them, including the largest one just mentioned, are all rather low. At the large one the immediate plant associates include the following:

<i>Cyrilla racemiflora</i>	<i>Osmanthus americanus</i>
<i>Clintonia monophylla</i>	<i>Stewartia malacodendron</i> (<i>S. virginica</i>)
<i>Kalmia hirsuta</i>	<i>Magnolia virginiana</i>
<i>Fothergilla</i> sp.	<i>Baccharis halimifolia</i>
<i>Azalea</i> 3 sp.	<i>Wisteria frutescens</i>
<i>Hypericum fasciculatum</i>	<i>Symplocos tinctoria</i>
<i>Vaccinium</i> sp.	<i>Lyonia nitida</i> (<i>Pieris nitida</i>)
<i>Liquidambar</i> <i>Styraciflua</i>	<i>Persea Borbonia</i>

While some of the above species are occasionally found on higher and dryer land, most of them (with the exception of *Symplocos*) usually grow only in damp soil. Immediately adjacent to this station is a small area of perhaps half an acre, that is covered by a solid growth of *Hypericum fasciculatum*. Here the water table is practically at the ground level. At no time during the past three or four years has the author ever seen this area without some water showing at the surface. Where the *Elliottia* grows nearby, the ground level is at no point more than five feet higher than it is at this stand of *Hypericum*, and most of it is not more than three or four feet higher.

At this station is found the best evidence that the plant actually does reproduce itself by seed. Here there are many hundreds of plants ranging in size from seedlings seven or eight inches high, to mature plants up to eleven feet tall. Here also occurs the most profuse flowering seen during these investigations. Formerly there was a scattering growth of pines over this station but these were cut off some years ago and now the whole area is in open sunlight. This fact probably accounts for the profuse flowering. The station covers an irregular area ranging from 30 yards to almost 200 yards in width by a quarter of a mile in length.

Across a small stream from this station and about 200 yards away more plants are found. Most of them are scattered through a heavy growth of other shrubs and here are found the largest known specimens. There are three trees, all of which are above 20 feet in height, one of them being more than 30 feet tall and measuring five inches in trunk diameter, three feet from the ground. These trees are in ground that is fully as low-lying as that at the large station across the creek. Several smaller plants, some up to seven feet tall, grow on rising ground close by, but none of them under the typical "sand ridge"



PLATE I

Elliottia racemosa, a rare American shrub, indigenous to a restricted area
in eastern and southern Georgia.

conditions specified as the habitat for this plant by some botanists.

In south central Georgia and some 80 miles southwest of the large station the plant occurs again. Here it grows near the foot of a sloping sandy ridge, adjoining the swampy area along a small creek. The surface soil seems to be much the same as found at the other stations. While this station is higher and dryer than those in the eastern part of the state, nevertheless the soil must contain considerable moisture as the immediate plant associates include thrifty specimens of both *Cliftonia monophylla* and *Cyrilla racemiflora*. Typical plants of black-jack oak are found nearby, but all of them grow higher up the slope than does the *Elliottia*. There are hardly more than a dozen plants at this station. They range in height from about three to eight feet. There are no small plants and there is no evidence of reproduction.

In the National Herbarium at Washington are deposited specimens of *Elliottia* collected by R.M. Harper on September 22, 1903 bearing the notation "very dry pine barrens north of Douglas, Coffee County, Georgia." Dr. Harper has informed the writer that he located this station many years ago and could hardly direct anyone to it now as the present roads probably do not follow the cart tracks of that time. As a consequence there has been no opportunity to check this station, for Dr. Harper is too reliable a collector for his information to be questioned, but it seems that while this plant is adapted to exclusively sandy soil it is somewhat indifferent as to moisture. However, the only stations where there is any evidence of reproduction itself are the lowest and dampest of them all.

In all the published descriptions of *Elliottia* that the author has seen which have appeared since Elliott's "A Sketch of Botany of South Carolina and Georgia" published in 1821, there occur some statements which are apparently erroneous. Most of the description given by Rehder in Bailey's *Cyclopedia* is correct, but he makes two statements to which the present writer cannot subscribe. He states "propagation by suckers, which appear only occasionally." Exception is taken to this for the reasons given above. Again he states "racemes—often branched at the base." The author has seen literally thousands of racemes, but he has yet to see one that branched either at the base or elsewhere.* If there exists any herbarium specimen with a branch-

*The description of the racemes as "often branched at the base" may be easily misunderstood, and therefore I have changed it in my *Manual of Trees and Shrubs* (p. 678) to "pedicels slender, 6-12 mm. long, the lower ones sometimes branched," which is more correct since it is not the axis of the raceme itself but the lower pedicels which are branched, so that the raceme becomes a panicle. It may be added that it would be more accurate to replace "sometimes branched" by "often branched" or even "usually branched." Alfred Rehder

ing raceme, this description should read "occasionally" instead of "often."

Small, in his *Manual* states "flowers—in short panicles." A better description would read "elongated" instead of "short," for the reason given earlier in this article. Again he states "calyx-lobes 3 or 4." In the several years this plant has been under observation neither a three-parted flower nor a three-parted capsule has been seen. A preferable statement would be "perianth segments usually four but frequently five." Until this year the author would have written "occasionally" instead of "frequently," but in June, 1937, several hours were spent in photographing the plants in flower, and while engaged in this a number of plants were noted on which many of the flowers had their parts in fives. While collecting seed in the fall, a fairly large group of plants was noted on which a majority of the seed capsules were five-parted.

There is a Government Weather Bureau station not far from the largest *Elliottia* station, the altitude at both places being slightly under 200 feet above sea level. The station records cover the past thirty-nine years and show an average annual minimum temperature of 54.7 degrees Fahrenheit, the average minimum for the three winter months being 39.6 degrees. Record "lows" during the 39 years were December (8° above zero); January (12° above zero); and February (2° above zero). Precipitation averaged 49.04 inches annually.

Efforts to transplant *Elliottia* at Biltmore, North Carolina, have not been entirely successful. About four years ago six plants were brought in, four of which are still living. One succumbed in 1936, possibly as a result of the heavy freeze in March of that year, and another died the same year, but as it had some protection the heavy soil in which it was planted probably was the cause of its death rather than the low temperature. The other four plants are still living and appear to be a little thriftier as each year passes. One of them has even developed an occasional flower. It is hoped that they will eventually become acclimated and thrive. Evidently the plant will withstand fairly low temperatures if given proper soil conditions, a very sandy loam with a definite acid reaction.

William A. Knight
Biltmore Forest
Biltmore, N.C.

A Tribute to an Eminent Botanist

Forty years ago this month the Arnold Arboretum welcomed from Germany, Alfred Rehder, a man who is today one of the foremost botanists of America. In 1883 Professor Alfred Rehder began writing articles on dendrological subjects for German periodicals, in 1895 becoming associate editor of *Mollers Deutsche gartner-zeitung*. In 1898, wishing to visit the Arnold Arboretum, whose fame was well known in Europe. Professor Rehder made arrangements with Professor C.S. Sargent, then Director, for one-half year as student-worker for \$1.00 a day while at the same time carrying on his editorial work for the German periodical.

It was not long before his accurate knowledge and painstaking care were recognized and when Dr. L. H. Bailey, who was compiling the *Cyclopedia of Horticulture*, asked Mr. C. E. Faxon, Assistant Director of the Arnold Arboretum, to make drawings for this work, Mr. Faxon not wishing to undertake it recommended Mr. Rehder. Mr. Rehder did a few drawings, then sent an article on *Aesculus*, telling Dr. Bailey that drawing was not his forte but that he would be willing to write on dendrological subjects. Whereupon Dr. Bailey engaged him to write all the dendrological articles for the *Cyclopedia*, a work of several years.

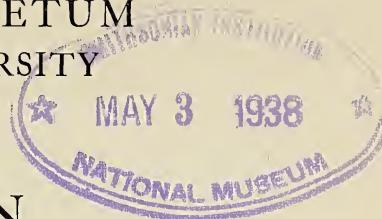
Meanwhile in 1900 an extensive work had been undertaken by the Arboretum, the *Bradley Bibliography*, a guide to the literature of the woody plants of the world published before the beginning of the twentieth century. This work was not progressing satisfactorily and in 1901 it was entrusted to Mr. Rehder who spent seventeen years of exacting and conscientious labor upon it, traveling in this country and in Europe visiting the important libraries, examining untold masses of material and gleaning for his Bibliography 100,000 titles.

Upon the return of E. H. Wilson from China, Mr. Rehder cooperated extensively in the preparation of *Plantae Wilsoniae*, edited by Professor Sargent. Of inestimable value to horticulturists, botanists and even to amateurs interested in growing plants is Mr. Rehder's *Manual of Cultivated Trees and Shrubs Hardy in North America*.

And so the half-year has lengthened to forty years of fruitful labor in his adopted land, and best wishes for the benefit of his continued service and helpful companionship are extended to this modest gentleman.

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ARNOLD ARBORETUM
HARVARD UNIVERSITY



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THIS SPRING AT THE ARBORETUM

UNUSUALLY warm weather this year has forced many trees and shrubs into very early flower. The Japanese cherries bloomed approximately ten days early, and the crabapples will be in bloom nearer the first of May rather than the middle of May as is usually the case. Weather is always an unknown quantity, and if all the days were as cold and dreary as the one on which this is being written the Japanese cherries might well remain in bloom for sometime.

Considerable interest has been shown by the public this year in the cherries, and newspaper reporters estimated that about 35,000 people visited the Arboretum on Sunday, April 24, when they were at their best. This shows an unusually early interest in the collections at the Arboretum. Because of the warm weather, *Prunus Sargentii* lasted about three or four days, but *P. subhirtella*, *P. subhirtella autumnalis*, and *P. yedoensis* all lasted a full week. *Prunus incisa* was particularly well flowered this season, and the plants of the double-flowered *P. triloba* are still in splendid condition.

Amelanchiers of various species have been in full bloom for several days this week. Professor Sargent placed many at outstanding points of interest so that their conspicuous white blossoms are seen everywhere and impress upon visitors the fact that spring has come to stay. Although they do not hold their flowers more than a few days in warm weather, they are true harbingers of spring.

Magnolias

The magnolias have been in excellent condition, particularly the early flowering *Magnolia stellata* which was in good shape for over a week, while *M. kobus borealis* also did very well. One large specimen of this interesting, tall-growing tree (it is the tallest growing of all the Asiatic magnolias) close to the Administration Building has been observed by several people who ask why it does not flower well. This year it had only a few scattered flowers, as it did last year and the year before that. Unfortunately, because of this some think that the variety does not bear flowers well until it is considerably older.

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However, a close examination of this particular tree will show that it has been girdled for over three-fourths of the way around the base of the trunk, apparently by mice or rabbits. No tree can be expected to have good blossoms under such circumstances. There is a tree of the same variety, between the Administration Building and the wall along the Arborway, that is only about eight feet tall, but is literally covered with blossoms, showing that the variety does bear early flowers providing it is in good health and the soil conditions are favorable. *Magnolia denudata* and *M. Soulangiana* flower buds were somewhat injured by a late cold snap early in April. It is of interest to note again the hardiness of the flower buds of *M. stellata* and *M. kobus* and its variety, which, though they were considerably farther advanced than the flower buds of *M. Soulangiana*, were not injured in the least by this cold spell.

New Foliage Appearing

Right now the Arboretum is clothed in a mantle of many shades. The new foliage of certain plants varies considerably in color when it first appears. Some, like the early *Prunus sinensis* and *Berberis Thunbergii*, show a bright green. Others, like *Viburnum Lentago*, and certain species of *Betula* and *Erythronium*, are bronze and blend splendidly with the other shades. On the other hand, the Japanese maples and some of the *Ribes* species have young foliage which at first is bright red. The Schwedler's maple and *Cercidiphyllum* also possess a fine reddish-bronze color early in the season, though the color of the former may last for a considerable period, finally changing to a dark green by the end of the summer.

Many people fail to appreciate the beauty of the early spring foliage. This is only natural, since spring usually comes with a rush and there are so many conspicuous flowers to draw our attention that we do not take the opportunity to admire all the different kinds of leaves. However, from the top of Bussey Hill or Peter's Hill, there is now, a splendid view of this early foliage. It is interesting to stand on such a high point either in the Arboretum or anywhere else where there are a number of trees and try to identify the various trees and shrubs from a distance simply by this early foliage color. A larch will be easily spotted because of its bright green color and definitely pyramidal growth habit. Beeches will be noticed because of their gray bark and delicately hazy green leaf-color. The oaks can be readily determined by the late appearance of their young leaves which vary in color from a deep yellow to a good bronze or gray-green. A careful observance of these plant characteristics at this time will lead to a greater appreciation of the beauty of the spring as it gradually unfurls, changing color from day to day.

The crabapples are fast approaching their blooming season—ahead of time. From the appearance of the large number of flower buds on the trees it looks as if the flower display in this collection will be unusually good. *Malus baccata mandshurica* is in bloom now, and other

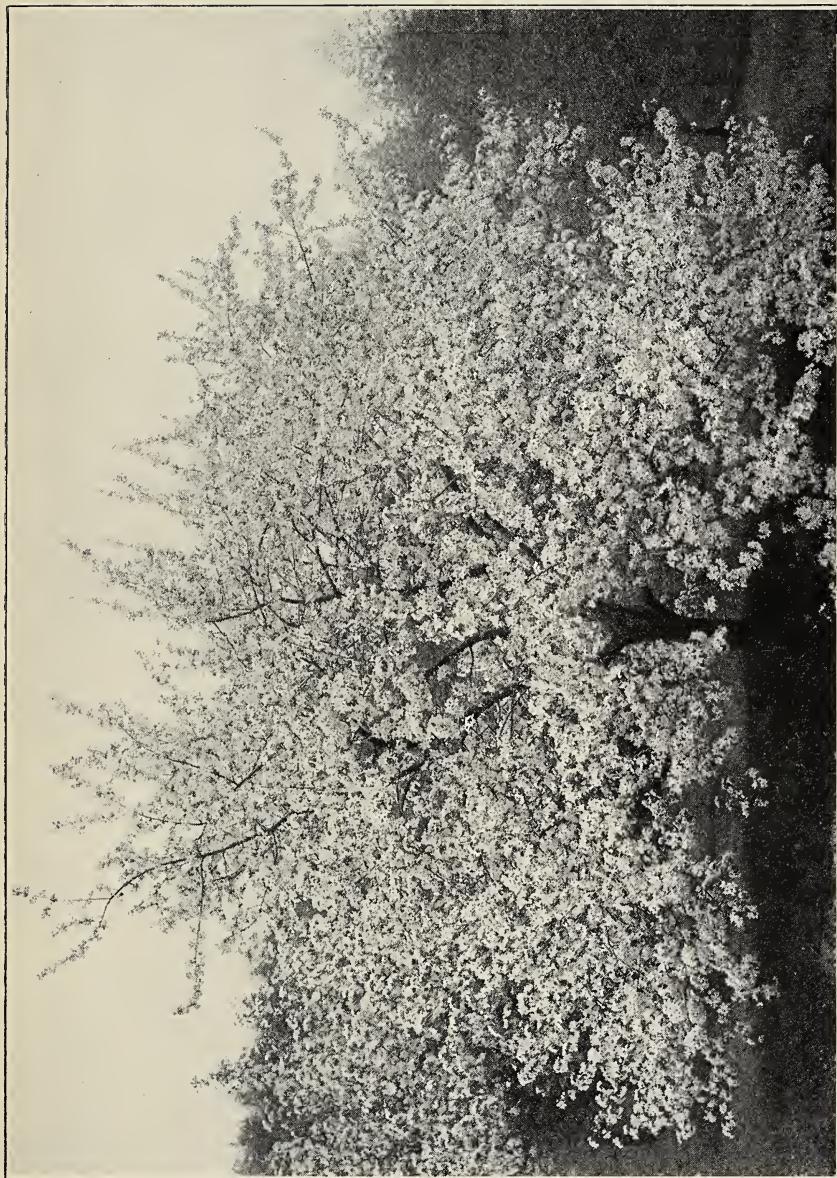


PLATE II

Malus baccata mandshurica, now in full bloom,
is the first of the Asiatic crabapples to flower.

species and varieties will be coming out during the week. These plants are all subjected to that phenomenon of nature—alternate bearing. They have good crops of fruit one year and poor the next. In fact there is one tree in the older crabapple collection at the base of Peters' Hill which has a line of demarkation that can be easily seen almost every year. Half the tree blooms and fruits well one year, while the other half does not. The next year this is reversed. By a complicated system of fertilizing over a period of years, orchardists are able to control this to some extent. Experimentally the alternate bearing of one half of a tree has been obtained by special fertilizing. Normally, however, there is little that the average home owner can do about this interesting phenomenon. If the trees are well taken care of and in splendid growing condition, fertilized each year, the alternate bearing may not be so pronounced as it is in starved trees. Particular attention should be given to *Malus Lemoinei* this season. Last year one small plant had the darkest flowers of any of the *Malus* group. If any Bulletin readers have this tree, please send in notes on the color of its flowers, since it apparently has good possibilities as an ornamental flowering tree.

Plant Breeding

Those visiting the Arboretum this spring will undoubtedly see many cellophane bags on trees and shrubs everywhere. This is evidence of a considerable amount of plant hybridizing now being done on the grounds by staff members, under the supervision of Dr. Karl Sax of the Arboretum staff. There are several reasons for this activity. In the first place, the Maria Moors Cabot Foundation for Botanical Research was established on a long-range research program for increasing the production of cellulose by plant breeding, particularly tree breeding. Part of this work is being done in the Arboretum, particularly that part dealing with the hybridization of trees by artificial pollination in order to evolve more rapidly growing strains. Although this is only a small part of the work, it is the part which an Arboretum visitor notices.

Other hybridization is being done with the ornamental plants in order to study them more carefully from a genetical point of view and also with the chance that new hybrids may be obtained of ornamental value. Those who read a recent article in the Saturday Evening Post on the breeding work with marigolds may realize the tremendous numbers of individuals which should be grown. In any such breeding work the more individuals grown, the better the chances for variation. Woody plants are slow in reaching maturity and often it is ten to twenty years before they flower. Consequently such a program necessarily must be carried out over a long period of years, particularly when the number of individuals grown is as severely limited, as it is in the Arboretum where space is at a premium. Hundreds of crosses are being made among outstanding ornamentals in the hope that some may yield new or interesting garden plants.

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SPRING RUSHES ON!

WHEN we read in the papers that the Japanese cherry trees were blooming in Washington, D.C., the latter part of March—ten days ahead of time—we were not particularly interested. But that was the forerunner of an unusually early spring season which has blanketed the eastern part of the country at least from South Carolina to Maine. All types of plants are blooming unusually early. Even ornithologists tell of bird migrations being noted the earliest in years. Still the warm weather prevails. Those who have visited the Arboretum this spring have seen many plants blooming a week or ten days earlier than in previous years. This bulletin is written to inform our readers of the situation, so that they may not miss certain displays which normally come later at the Arboretum.

Lilacs

Lilacs are in full bloom now. If the weather is cool during the next week, the plants will probably remain in fairly good condition, but if the days are very warm the flowers will fade rapidly. Sunday, May fifteenth, will be Lilac Sunday, a day on which the largest crowds of the year visit the Arboretum. Some of the early flowering lilacs started to bloom the week of April twenty-fifth, and at the time this bulletin is being written *Syringa oblata dilatata* is at the height of its beauty. A very few of the *S. vulgaris* hybrids flowered last week in the Arboretum collection, and here and there in gardens around Boston, where in a warm sunny location, individual lilac bushes were in full bloom.

The two greatest collections of lilacs in the world are in the United States. The collection at the Arboretum contains 417 named species and varieties, while that at Rochester, New York, contains 390. It is interesting to note that the flowering of the collection at Rochester

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is also considerably advanced so that Lilac Sunday there will probably be May fifteenth. Normally, both this excellent collection and that at the Arnold Arboretum are at their best about a week later.

The blossoms on the plants this year are not as profuse as last year. Lilacs, like many other ornamental woody plants, are subject to alternate bearing, the good flowers of one year being followed by poor blossoms the next. In large collections, however, there are sufficient bushes flowering well each year to make a visit worthwhile even for the most casual observer.

Crabapples

Although such gorgeous crabapples as *Malus floribunda*, *M.arnoldiana*, *M.baccata*, *M.hupehensis*, *M.atrosanguinea*, *M.purpurea*, and *M.spectabilis* have already faded, several of the crabapples are in full bloom now. One is the Sargent crab, (*M.Sargenti*) the lowest growing of all, the pure white flowers of which make it most conspicuous. The double-flowered Bechtel crab (*M.ioensis plena*) and several others can be seen in the collection at the base of Peter's Hill. The crabapple bloom this year was good, but because of the warm weather the flowers opened so quickly that there was not the mass of color in the collection which has made such a vivid display in previous years.

Other Plants in Bloom

Azaleas have been outstanding for several days. Earlier in the season *Rhododendron mucronulatum* was severely injured by a late freeze, but *R. Schlippenbachi* was in full bloom on May first, and *R. yedoense poukhanense* was in full bloom a few days later. The torch azalea *R. obtusum Kaempferi* is now at its best. This plant was considered by Professor Sargent as the most brilliant of the Arboretum's introductions from Japan. There are literally thousands of them planted around the Arboretum grounds, and every spot graced by their vivid color is now a place of beauty. Some have been planted in the woods by the pond adjacent to the shrub collection. A thousand were planted several years ago in the woods next to the old Bussey mansion on South Street. These shrubs will increase in size and beauty with the years.

By far the best collection of the torch azalea is on the top of Bussey Hill, where there is a mass planting of splendid specimens six feet tall. Every year these plants, growing under the century old pines on the top of the hill, are admired by thousands. Another colorful planting is a little below this on the same hill. The torch azalea is best planted in the partial shade of the woods, since its delicate flowers are easily injured by too much bright sun. Several of the



PLATE III
The lilac path at the Arboretum.

other Asiatic azaleas thrive under the same sheltered conditions. Our native *R. calendulaceum*, which usually blooms about the first of June, can withstand a great deal of sun and does not fade nearly so soon as the Asiatic species.

Although the entire countryside is particularly beautiful at this time of year, the Arboretum is an even more gorgeous spectacle, for it is enhanced by the artistic plantings of thousands of exotic trees and shrubs. Many other plants should not be overlooked at this time. *Rhododendron Vaseyi* can be seen at its best along the edge of the pond near the shrub collection and also along the road bordering the horsechestnuts. A few of the "Ghent" and "Mollis" hybrids are beginning to flower now, as well as *Rhododendron carolinianum* and a few other early rhododendrons in the collection at the base of Hemlock Hill. In fact, the entire Rhododendron collection will probably be in bloom either the last week in May or the first of June, provided this warm weather continues.

The flowering dogwood, *Cornus florida*, is blooming profusely again this year. Last year its blossoms and bright colored fruits were more numerous than in many years, not only in the collections at the Arboretum, but also in many other parts of the East.

The three species of *Fothergilla* are in full flower. Although native to the southeastern United States, the Fothergilla was first cultivated in English gardens more than a century ago and only recently appeared in American gardens. The genus is named after Dr. John Fothergill, who in the eighteenth century cultivated in his gardens what was then one of the most complete collections of American plants. The three members of this genus are closely allied to the witch-hazels, as suggested by their similar leaves. The peculiar "bottle-brush" flowers are conspicuous because of their long white stamens.

Fothergilla Gardeni is the lowest growing of the three, being only about 3 feet tall; *F. monticola* grows about 6 feet tall, and *F. major* about 9 feet. There is a splendid specimen of *F. major* by the pond at the base of the *Philadelphus* collection. One of the most outstanding characteristics of the Fothergilla is its autumn color, for if it is planted where it is exposed to the full, late afternoon sun of September the foliage turns to a gorgeous orange and red. One of the plants in the shrub collection is of interest every year, for on the side facing the Arborway (east) the leaves are never anything more than a brownish yellow in the fall, while on the side where the foliage gets the direct sun of late afternoon in September the leaves turn brilliant orange and red.

DONALD WYMAN

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MAPPING THE ARBORETUM

AS THE number of living plants has increased in the Arboretum, the problem of locating individual species naturally has become more and more difficult. Many thousands of individual trees and shrubs representing over 7000 named species and varieties from the north temperate zone of both hemispheres are growing in the glades and on the hills within the Arboretum boundaries. A handy record is essential to locate them when access to a particular species or variety is needed for horticultural or botanical purposes.

The basic plant records of the Arboretum are kept in card index form. The data on the cards give the history of the plant, including its name, origin, date of acquisition, number and the general collection (e.g. maples, lindens, etc.) in which it is to be found. Such a record was adequate for its purpose as long as the collections were comparatively small and each staff member could have a thorough knowledge of the grounds. Experience eventually taught that a supplementary graphic record is absolutely necessary. Thousands of plants spread over 265 acres of widely diversified grounds cannot be exactly located by means of approximate references and brief descriptions.

One of the important projects recently initiated at the Arnold Arboretum has been the actual mapping of the positions of all the trees and shrubs in its extensive living collections. Prior to this time partial surveys had been made, and maps covering certain sections had been prepared which unfortunately were not kept up to date. The new and complete survey will involve between seventy and eighty maps, each measuring 2 by 2½ feet. The progress made in the last seven months indicates that the work will probably be finished by the end of the present calendar year.

Two scales are being used: 1":20' and 1":10', i.e. one inch to 20 feet and one inch to 10 feet. The 1":10' maps are designed to show in detail the positions of all small plants or shrubs cultivated in congested areas, thus supplementing the standard ones. The scale 1":20' is the standard adopted for the general maps where for the most part tree species are involved.

The instruments used in our work would not satisfy the requirements of the Coast and Geodetic Survey. They are essentially those which were available to George Washington in the days of his youth, that is, the magnetic compass, the alidade, and the chain. In their modern form these instruments are available in the standard K. & E. Traverse Table and in the usual 50 and 100 foot tapes. The alidade is the device that establishes a line of sight between two points. It has a fore slit, a back vertical thread, and a side ruler that is scaled, in our case to one inch for 40 feet. By putting the point to be "spotted" in line between the slit and the thread and sealing off its distance on the table, one determines its position and its distance from a station at which the instrument is set up. The distance between the station and the plant is actually measured, or, if it is inaccessible, determined by sighting the point from two or more different stations. The intersection of the lines of sight gives the location sought.

Crude as these instruments are, they are surprisingly accurate if the user has a definite understanding of their limitations. The normal rate of error is about one foot in one hundred, which is more than satisfactory for a survey of the type in which we are interested. Sufficient accuracy in the long range is assured by so called traverse lines that connect landmarks within property limits. The partial surveys are integrated on these traverse lines. Each partial survey shows the positions of three or more trees in each adjacent area. Thus it is possible to overlap the surveys on known points, singly and as a whole. The disadvantages inherent to this manner of field work are apparent to the professional surveyor. Its advantages for our particular work, however, are simplicity of operation and availability of record with a minimum amount of time and with limited personnel. About 180 acres were covered in sufficient detail to outline the main features of the maps and to locate the majority of trees in about ten weeks of actual operation. The use of precise instruments yields precise results, but involves exacting requirements. It is debatable as to whether or not the record secured by a regular survey would be more serviceable, cost considered, than that secured by use of the traverse table.

The field record taken at the scale of 1": 40' is assembled and reduced to the scale of 1": 20', or 1": 10'. Each map covering an area



PLATE IV
An airplane view of the Arnold Arboretum.

400 by 600 feet is drawn on tracing cloth at the scale of 1":20'. From this master map a black and white print is made. This print is carefully checked in the field, the necessary revisions, corrections, and additions being then made. The changes are eventually transferred to the master tracing cloth map. When the field check is finished and the data all transferred, each master map is then divided by four intersecting lines that determine sections, or quadrants A, B, C, D. Lastly, the exact position of each plant is recorded on the index cards, references being added to the map number and to the quadrant. The card entry, *Acer negundo* 6 | B, for example, indicates that the corresponding plant is located on map 6, quadrant B. This establishes its position within a definitely located tract measuring only 200 by 300 feet.

Revisions of the master map will be made as changes in the plantings occur; that is as plants are moved, removed, or added. The necessary corrections will be entered on the prints in the field in connection with all future operations. Since each revision will be dated, the corrections will be transferred from the prints to the master maps only once or twice a year. Thus at a glance the record will tell whether or not the master map is up to date. If it is not, the print must be consulted. In either case, the necessary data are readily available.

The method that we have selected answers our problem. Its low cost, simplicity, and the time element involved commend it in this particular case. Directors of small botanical gardens have, at times, found it convenient to prepare diagrammatic sketches of plant groups as to the location of individual plants in a loose-leaf book. The method is excellent where large maps are not needed, but is inadequate in an area as large as the Arnold Arboretum.

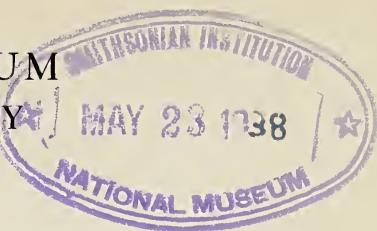
These maps of the Arboretum will become a most important part of its records. They will be very useful to the visitor and to the student who wishes to consult either a few or many plants in any particular group. They will be able to locate what they are looking for with a minimum amount of walking. They will be of even greater use and value to the staff members concerned with the care, study, and amplification of the very extensive living collections. Comprising as they will the exact location of every planted tree and most of the individual shrubs within an area of 265 acres, representing somewhat in excess of 7000 named species and varieties, they will help make the Arboretum collections more and more a source of inspiration to the lovers of fine plants.

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ARNOLD ARBORETUM
HARVARD UNIVERSITY



BULLETIN
OF POPULAR INFORMATION

SERIES 4. VOL. VI

MAY 20, 1938

NUMBER 6

ORIENTAL FLOWERING CHERRIES

THE Oriental flowering cherries, when in bloom, present such a picture of beauty to the eye that there is frequently a feeling of disappointment when it is found that these flowers are often without fragrance.

The question may then be asked, which, if any, of these cherries have attractive fragrance, and if the quality of fragrance is desired, can a selection be made that will embody this quality as well as being otherwise satisfactory? To help answer this question, the following compilation has been made, based chiefly on the description of these cherries in the late Dr. Wilson's book "The Cherries of Japan", and in "The Oriental Flowering Cherries" by Paul Russell of the U.S. Department of Agriculture. The critical comments, where they appear, are Dr. Wilson's, than whom there could hardly be a more competent or experienced observer.

FLOWERS PREDOMINANTLY WHITE.

Oshima Cherry (*Prunus Lannesiana f. albida*). A small flowered wild mountain type, usually short-lived. Flowers single, white, and only *faintly* fragrant.

Habutai. This is listed in some Japanese catalogues as having large white flowers with a silky sheen as being *very* fragrant. Wilson's comment, however, is that "it has little horticultural value".

Gozanoma-nioi. (Another name for this is *Ozu-mako*). Flowers single, white, and *very* fragrant.

Taki-nioi. (In Japanese this name means "Fragrant Cascade"). Flowers single, white, and *very* fragrant.

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Washino-o. (This name is also spelled as Wasinowo). Flowers single, white, *fragrant*.

Mina-kami. Flowers single, or nearly so, white, *very fragrant*.

Sumizome. Flowers single, or nearly so, white flushed with pink, very large. *Fragrant*. Wilson's comment is that it is "one of the most beautiful of all Japanese cherries".

Hosokawa. Flowers single, or semi-double (some Japanese catalogues list this as having semi-double to double flowers and as being *very fragrant*). Pure white, fragrant. Wilson's comment is that "it is a pleasing form".

Jo-nioi. (This name in Japanese means "Supreme Fragrance").

Flowers single, or semi-double, of remarkable pure whiteness.

Very fragrant. Wilson's comment is "a lovely plant, the *most fragrant of all the forms*".

Kunrinjo-shirotae. (Also sometimes spelled Kurinjo-shirotae).

Flowers semi-double, white, *fragrant*.

Senriko. Flowers semi-double, very large, pale pink passing to white. *Fragrant*. Wilson's comment is "one of the most beautiful of its class".

Suragadai-nioi. Flowers semi-double, pink fading to nearly white, pendulous on long slender pedicles. Late flowering form. *Fragrant*.

Shirotae. (This name is sometimes spelled Sirotae, and it is also at times designated as Mount Fuji). Flowers double or semi-double, large, pure white. *Fragrant*. Wilson's comment is that "this is the *finest of all* the double flowering white cherries".

Miyako. Flowers double, white flushed pink. *Fragrant*. Wilson's comment is that "it is *one of the best* of the late flowering forms".

Yaye-oshima (or Yae-zakura). Flowers double, white, *fragrant*.

FLOWERS PREDOMINANTLY PINK.

Banriko. Flowers single, large, pale washy pink. Some Japanese catalogues list it as being *very fragrant*, but Wilson's comment is that it is "a form of very little horticultural value".

Hitoye-zakura. (This is the type form of *Prunus Lannesiana*). A cultivated form with single, pink flowers. *Fragrant*.

Kirigaya. Flowers single, pale pink, *fragrant*.

Ariake. Flowers single or semi-double, very large, pale pink, *fragrant*. Wilson's comment is that it is "a very striking form".

Amanogawa. (This name in Japanese means "Milky Way"). A tree of fastigiate habit. Flowers semi-double, pale pink, *fragrant*.

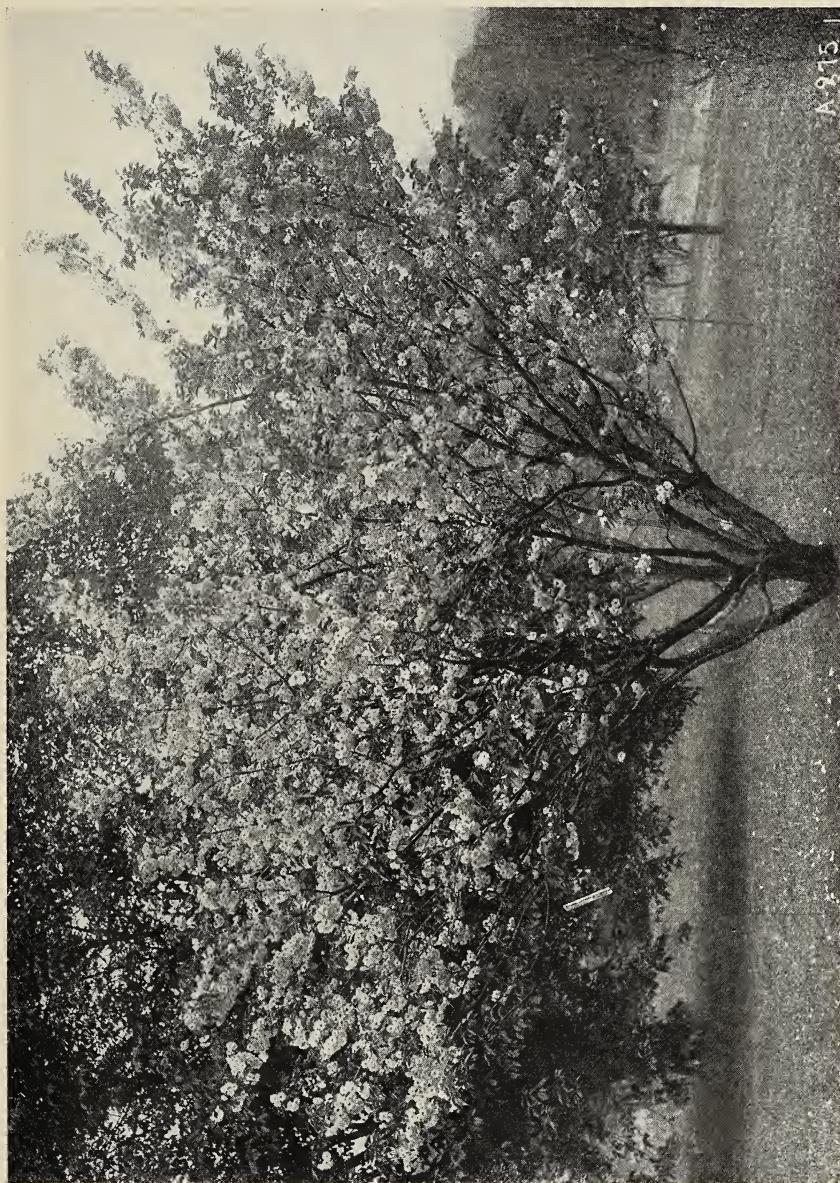


PLATE V

A fragrant double flowering Japanese cherry at the Arnold Arboretum.

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grant. Wilson's comment is that "it is a beautiful form, very distinct in its habit of growth".

Botan-zakura. (This name means "Paeony Cherry"). Flowers semi-double, pale pink, very large, *fragrant*. Wilson's comment is that it is "one of the very best forms".

Higurashi. Flowers double to semi-double, pale pink, *slightly* fragrant. Wilson's comment is that it is "a good form".

Ise-zakura. Flowers semi-double, rose pink, *fragrant*.

Yae-akebono. (This name is also spelled Yaye-akebono). Flowers semi-double, very large, soft pink, *fragrant*. Wilson's comment is that it is "a very beautiful form".

All of the foregoing varieties are classed as forms of *Prunus Lanessiana*.* In addition, the following are also listed as being more or less fragrant.

Prunus Sieboldii, Takasago Cherry. (Other names for this cherry are Naden and Musha-zakura). Flowers are semi-double or occasionally single, delicate pink or sometimes nearly white. Wilson does not specifically refer to this species as having any fragrance, but Russell describes it as having fragrant flowers.

Prunus yedoensis, Yoshino Cherry. Flowers vary from white to pink and are *slightly* fragrant. Wilson's comment is that it is "one of the most floriferous and beautiful of the oriental flowering cherries".

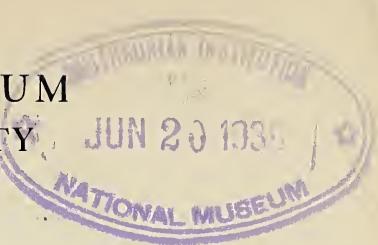
CLARENCE McK. LEWIS
"Skylands"
Sterlington, New York

*A group of Japanese cherries mostly garden forms which differ little from *P. serrulata* and are now generally included in that species.

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THE LARZ ANDERSON COLLECTION
OF JAPANESE DWARF TREES

“The Larz Anderson collection of Japanese dwarf trees presented to the Arnold Arboretum as a memorial to his friend, Charles Sprague Sargent,” is an explanatory statement quoted from the carved inscription displayed with these intriguing plants. This group of dwarf trees is unique in this country and was received at the Arboretum last fall. The plants have just been placed on public display in a newly erected shade house. Brought to this country at a time when strict plant quarantines were not in force, these plants were imported with soil around the roots in their original Japanese containers. The Arboretum welcomes the opportunity of being able to display these striking examples of Japanese horticulture to its visitors.

The Honorable Larz Anderson became interested in Japanese horticulture as early as 1907 and built a particularly attractive Japanese garden on his estate in Brookline, Massachusetts. Somewhat later he became interested in dwarf trees and in 1913 he brought back from Japan a splendid collection of them, which he acquired while serving as Ambassador Extraordinary from the United States to Japan (1912-1913). These he placed on display in his own garden where they were carefully tended for twenty-five years by different Japanese gardeners. The collection has been displayed at several exhibitions in Boston where it invariably won high honors.

This unique collection has just been placed on display at the Arnold Arboretum in a new shade house erected for this purpose with funds provided by Mrs. Anderson. This is situated between the old Bussey Institution building and the greenhouses, fairly close to the hedge collection. Around the shade house have been planted a few shrubs

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and trees native to Japan, and during the next few years it is planned to augment this planting. The collection now installed in the shade house consists of 29 specimens, all imported in 1913. They are well labelled, but for those unable to visit the collection (the house is open from 9:00 a.m. until 5:00 p.m. each day except Saturday, Sunday, and holidays) the names of the individual plants and their respective ages are given below.

Name of plant	Age
Chamaecyparis obtusa	200 years
"	150 "
"	135 "
"	105 "
"	75 "
"	50 "
Acer Buergerianum	85 "
" palmatum	50 "
"	50 "
"	45 "
"	45 "
"	40 "
"	40 "
"	40 "
"	35 "
" multifidum	50 "
Cryptomeria Japonica	35 "
Larix leptolepis	125 "
Photinia villosa laevis	55 "
Prunus mume	85 "
"	75 "
" subhirtella	85 "
"	75 "
"	65 "
Thujopsis dolobrata variegata	30 "
"	30 "
Zelkova serrata	75 "
"	50 "
Chamaecyparis pisifera squarrosa	30 "
Cryptomeria japonica	30 "
Evonymus fortunei radicans	30 "

"Bon-sai", the art of training dwarf trees

Century old customs have been handed down by the Japanese regarding the training of the interesting dwarf trees so characteristic of the gardens and homes of that country. There are several reasons for their existence. In the first place, Japanese and Chinese gardens are

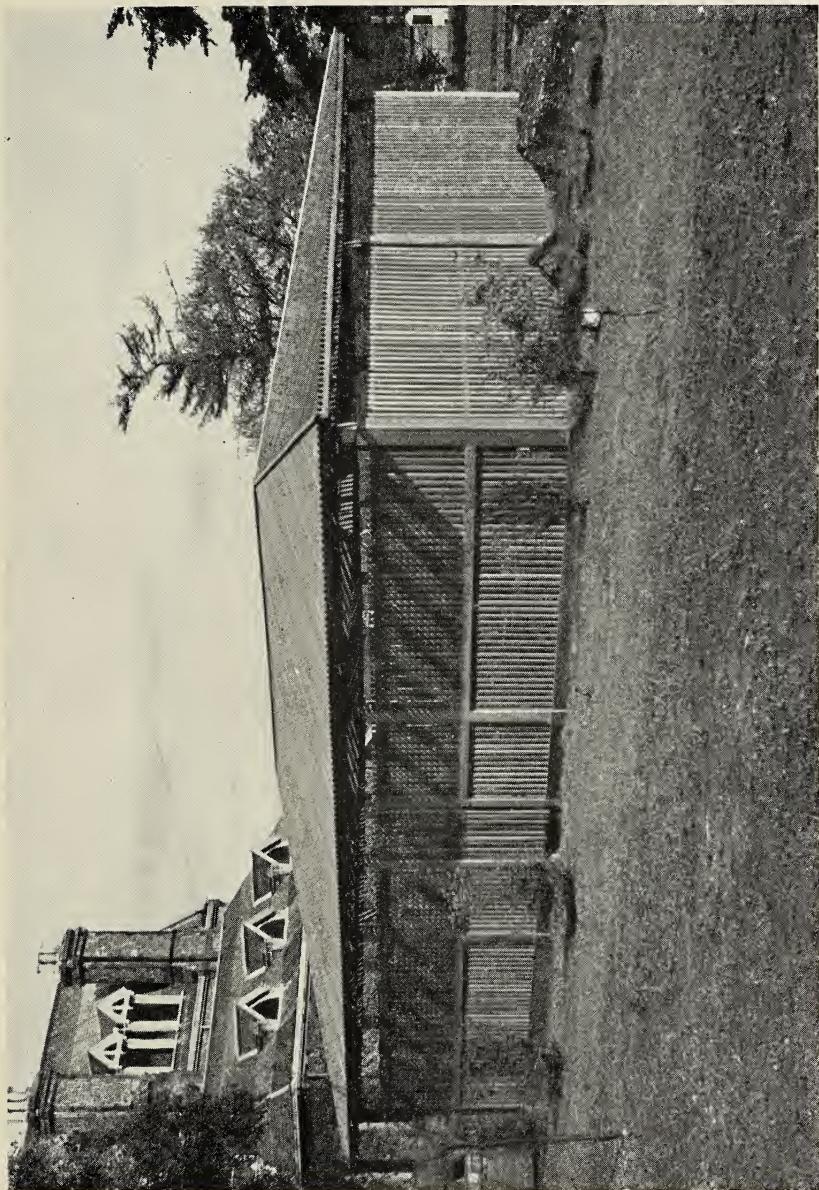


PLATE VI
The new shade house containing the Larz Anderson Collection of dwarf trees.

usually small, for space is at a premium. This is particularly true in Japan where the art of making gardens on a very small scale is centuries old. Then, too, the oriental's well known appreciation of the aesthetic value of living plants has been a prime factor in their cultivation. It often takes fifty to one hundred years to grow a worthy specimen dwarf tree, yet it is possible by twisting the trunk and restraining the growth of tops and roots to give a comparatively young plant the appearance of great age. This treatment requires a thorough knowledge of horticulture as well as painstaking patience, but many Japanese are fascinated with "Bon-sai" and practice it as a pastime.

Training

Most woody plants can be dwarfed if given the proper training. If the branches and roots of growing plants are vigorously restrained from developing rapidly, the individuals soon become dwarfed and this is the principle underlying all training. Then, too, great care is given to the training of the trunk, the spread of the branches and their shape, and the spread of the roots, since each can be so trained as to give the impression of great age. Many methods have been devised through the centuries for attaining these ends. Maples, bamboos, cherries, pines, hollies, oaks, azaleas, junipers, and many other plants have been used. They are grown in comparatively small containers, kept pot bound throughout their existence, and carefully and judiciously pruned to maintain the desired type of growth.

Whenever possible, the Japanese start with plants that have already been dwarfed by nature. These are searched for in the high mountains, in regions often unfamiliar to the ordinary traveller. Such plants are frequently found growing in high rocky crevices, just barely existing for lack of sufficient nourishment. If these are dug immediately and removed, they might succumb at once for the delicate balance between the amount of root system and bare existence is easily upset. The plant hunter may locate such plants several years before he will venture to remove them from their rocky dwelling. At first he will root prune a small portion of the plant and leave it in place for a year; then he will return and root prune another small portion, repeating this process until it is safe to move the plant. In this way splendid specimens are obtained that have already been trained with the assistance of mother nature herself.

If dwarf plants are to be trained from the seedling stage, the smallest and weakest seedlings are selected. Conifers are considerably easier to train, for they do not form adventitious buds as readily as do the broad leaved plants. The seedling is placed in a very small pot. If



PLATE VII
The Larz Anderson Collection of dwarf trees now exhibited by the Arnold Arboretum.

there is a tap root, it is pruned considerably, and if a central leader is present, it too is cut back. In order to obtain the desired effect, only certain branches are allowed to develop. As an example, *Chamaecyparis obtusa* is ordinarily a very bushy plant, yet the illustration (Plate VIII) shows only a few picturesque branches. These few branches have been carefully selected and trained, while the others have been entirely removed. If one of these branches should die, eventually a new bud would be allowed to develop a branch to sufficient size to take the place of the deceased one.

To give the correct appearance of wind-contorted shape, the main stem is often twisted around an upright, and after a formative period the upright is removed. This twisting in itself is a dwarfing process, since frequently it breaks a large number of the conducting vessels in the stem. Branches are twisted in like manner. They may all be trained on one side of the plant, or arranged to droop on one side of the pot, or trained in any one of a dozen different ways. The Japanese gardener usually has a model in mind when he trains his plant, some wind-twisted tree which he is trying to reproduce in miniature form, and it is surprising to the uninitiated to observe how accurate these reproductions can be.

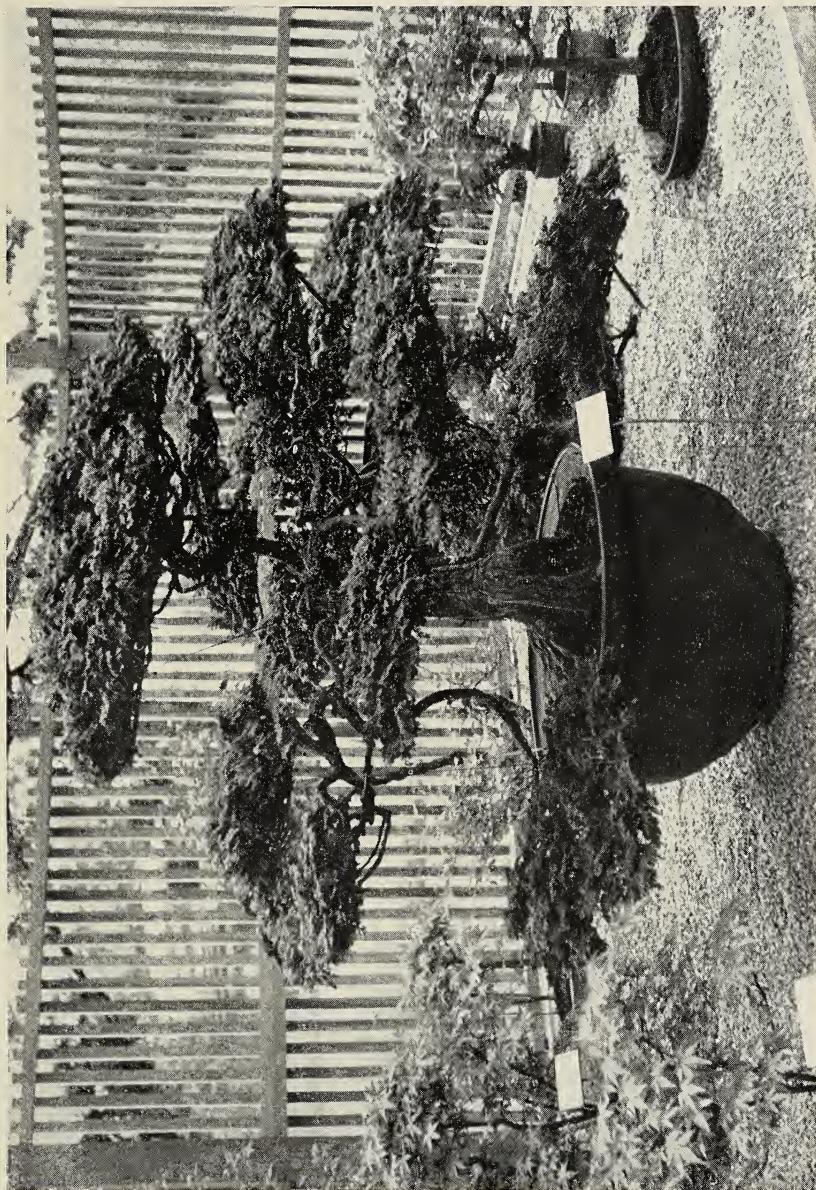
Often in nature one observes old gnarled trees the larger roots of which are exposed, especially when growing in rocky places where there is still soil. This effect is reproduced by the "Bon-sai" artist by growing his seedling in charcoal and moss for a period sufficiently long to induce long roots. When the plant is removed to its permanent container, a part of these roots are left to develop above the soil level, eventually aiding materially in giving the plant the appearance of great age.

Pruning, Repotting, and Watering

Not all branches are entirely removed. Some of these century old plants have numerous picturesque stubs, certain gardeners believing that these add to the beauty of the plant. Any diseased tissue on such stubs is carefully scraped, disinfected, and painted. Sometimes in order to gain the appearance of stubby old age rapidly, taller plants that have been growing normally are used. The basal branches are cut back to give the stubby appearance. The top is entirely cut off. The plant is dug and after many of the roots have been removed it is placed in a small pot. Then certain of the adventitious buds are allowed to develop, or else scions are grafted at the desired places.

Grafting is also resorted to when certain shoots die. If a very important branch has died, it may take many years for a new one to

PLATE VIII
Chamaecyparis obtusa, 150 years old. (Larz Anderson Collection)



grow to a sufficient size from an adventitious bud, so that grafting is often resorted to. The Japanese are particularly adept at this and take great pains in training an individual branch by pinching the buds back here, or twisting the branch there, and so forcing the latter to grow in the desired fashion. The pruning and pinching operations are done during the active growing period, since the development of branches from adventitious buds is then more frequent.

Dwarf trees are repotted every four or five years for two reasons. In the first place it is necessary to remove some of the newly developed fibrous roots so that the tree will remain dwarfed. Secondly, it is necessary to mix a small amount of fertilizer with the soil, since as these trees are forced to grow in very small containers, there is not sufficient room for enough soil to allow new root development unless the plant be artificially stimulated with nutrients.

It is also advisable to keep a fresh layer of green moss on the surface of the soil. This not only adds the impression of age, but keeps the soil from drying out. The containers are usually provided with a hole in the base for proper drainage. In the hot summer days there is some danger of the soil becoming too dry, and at such times the plants need special attention. Spraying the foliage with water once or twice a day during the hottest spells of summer is advisable in order to keep the plant in good condition.

Dwarf trees cannot be considered primarily as indoor plants. They may be used indoors for short periods, but must be grown in the open a greater part of the time. Because of their very small root system, and the small containers in which they are grown, these dwarf trees cannot lose much water through transpiration and still survive. Consequently they must be grown in a shaded location. The shade house in which this location is being maintained at the Arboretum was designed and erected especially for this purpose. Constructed of cypress wood, the top and sides of the house are covered with strips $1\frac{1}{2}$ inches wide with similar spaces left between each strip. This supplies plenty of shade and at the same time keeps the atmosphere considerably cooler and reasonably moist.

Winter Protection

Although many of these trees are hardy, they cannot survive our northern winters because of their shallow root system, unless given some winter protection. A Japanese maple, for instance, growing normally in the ground may survive a winter during which the temperature goes to 20° below zero although the top of the plant may be killed to the ground. However, in these small pots the roots of dwarf

trees would be subjected to temperatures almost as low as those of the surrounding atmosphere, and consequently the whole plant would be killed. During the winter in the north, they are best put in cold frames or pits which are well protected with glass and even with boards and mats during the most severe weather. In our pit where these plants were stored last winter the temperature did not go below freezing, although the temperatures outside the pit dropped to zero on several occasions. Another danger from freezing temperatures is that with the expansion of freezing soil the containers may break. Although these are seldom ornate, since the Japanese believe that the plant itself should be the point of interest, nevertheless their simplicity alone is beautiful and makes them important adjuncts to any such collection and thus worthy of full protection.

Thus with an exacting knowledge of the numerous rigid requirements of the art of "Bon-sai" the painstaking Japanese gardener is able to reproduce dwarf trees that are exact replicas in everything but size, of century old specimens as they occur in nature. The Japanese have developed other forms of dish gardening, but to the American horticulturist perhaps none is so interesting as "Bon-sai".

DONALD WYMAN

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NUMBER 8

PLANTS AND THE MEN WHOSE NAMES
THEY COMMEMORATE

“To him who in the love of Nature
Holds communion with her visible forms
She speaks a various language.”

FROM time immemorial Nature has spoken her language to the souls of men and held their minds enthralled; like an enchantress she has lured them over land and sea, to the far corners of the earth to search out her secrets and her hidden beauties. Many of our well-known trees and shrubs record the results of these journeys in the names they bear, perpetuating the names of men who have risked their lives to bring beauty from the wilds to brighten the gardens of the civilized world, while others honor the memory of some botanist working quietly in laboratory or garden. Research on the origin of these names opens a fascinating study in biography, history and romance. Thus for strictly herbaceous groups such familiar names as fuchsia, dahlia and lobelia perpetuate the names of men. The practice of selecting such names to commemorate individuals was commenced by Hippocrates and Theophrastus in the 4th and 5th centuries B.C., continued during the classical period, persisted through the Middle Ages, and thus following the Renaissance was adopted by European botanists and then transmitted to modern times.

From the many thousands of plants so perpetuating the memory of men, a few of the more common ones may be selected from the large number one notes in passing through the Arboretum. These are listed in the order of their blooming from early spring to late autumn.

Prunus Sargentii. One of the earliest and most showy of the flowering trees, this Japanese cherry is a beautiful and graceful memorial to Professor C.S. Sargent, for more than fifty-three years the Arboretum's devoted and able Director.

[43]

JUN 6 1938



Forsythia suspensa Fortunei. The forsythia, as is so well known, was named for William Forsyth (1737-1804), a prominent English horticulturist who was trained under Philip Miller and in 1784 became Royal gardener at Kensington and St. James' Palaces. The variety *Fortunei* received its name from Robert Fortune (1812-1880), a British traveler and horticulturist in China. He introduced the tea industry into India, and wrote a number of books on China and tea culture, the interest and value of which are very great. He was one of the first who opened the treasures of Chinese gardens to European horticulture.

Magnolia Soulangeana. Pierre Magnol (1638-1715), Professor of medicine and Director of the Botanic garden at Montpellier, and Etienne Soulange-Bodin (1774-1846), a French horticulturist and writer, are commemorated in the name of this magnificent tree.

Viburnum Carlesii. Hemsley named this attractive little shrub, valued for its delightful fragrance and handsome early flowers, for William Richard Carles of the British Consular Service. Carles was appointed a student interpreter in China in 1867, and in 1883 was sent by his Government to Corea, where, among other plants, he collected *Viburnum Carlesii*, which bears his name.

Malus Halliana Parkmanii. Hall's flowering apple, often called the Parkman crab, reveals an interesting history. Dr. George R. Hall of Bristol, R. I., after graduating from the Harvard Medical School in 1846, embarked for China, and in 1855 made a voyage to Japan. From Japan, in about 1863, he sent to this country by F. Gordon Dexter of Boston, a plant of the Japanese crab, which found a home in the garden of Francis Parkman in Jamaica Plain. It is probably true that the double-flowered Japanese apple was thus introduced into America before it reached Europe, and is named for the two men responsible for its introduction into cultivation.

Leitneria. The name of this plant is derived from that of Dr. E. F. Leitner, a German naturalist, killed in Florida during the Seminole war.

Fothergilla, bottle-brush, perpetuates the name of John Fothergill (1712-1780), an eminent English physician, who introduced and cultivated many new plants.

Sinowilsonia. As the fame of E. H. Wilson rest chiefly on his travels in China and his investigations of the Chinese flora, "Sino" meaning Chinese, is very appropriately bestowed upon this botanically extremely interesting genus, discovered by him in China and introduced into cultivation by him.

Berberis Thunbergii, a Japanese barberry with dainty yellowish flowers, introduced into cultivation about 1864, and named by De Candolle for Carl Pehr Thunberg (1743-1822), the celebrated Swedish



ROBERT FORTUNE (1813-1880)

botanist. Thunberg was an explorer of the flora of Japan, and subsequently Professor of botany at Upsala, succeeding the younger Linnæus. His "Flora japonica" (1784) is an important contribution to the flora of that country.

Mahonia. A member of the barberry family, this genus was named by Thomas Nuttall for Bernard M'Mahon (1775-1816), a prominent American horticulturist.

Rhododendron obtusum Kaempferi. A flaming beauty, the torch azalea, is indebted for its specific name to Engelbrecht Kaempfer (1651-1716), an eminent German botanist and traveler. Like many another of the early botanists, he studied medicine and the languages. In 1683 he accompanied the Swedish ambassador to Persia. Having passed into the service of the Dutch East India Company as surgeon, he visited Bengal, Java, Sumatra and Japan. On his return to Europe in 1693, he published an important work entitled "Amoenitates exoticæ" (1712), which contains the results of his researches in Persia and the other countries visited.

Amelanchier Bartramiana. This shrub's chief claim to distinction is in its specific name, which was given in honor of one of the Bartrams, father and son, famous travelers and explorers of the southern United States and whose garden, the first botanical garden in America, founded in Philadelphia in 1728, is still in existence.

Halesia. The halesia or silver-bell, a handsome tree covered in spring with a cloud of delicate, shimmering white flowers, honors the memory of the Rev. Stephen Hales (1677-1761), an eminent English philosopher. He made important discoveries in vegetable physiology and in 1727 published a work entitled "Vegetable statics."

Syringa Meyeri. This small shrub bears the name of Frank L. Meyer, successful collector for the United States Department of Agriculture. He was born in Holland in 1875 and lost his life in the Yangtze River in 1918.

Wisteria, also spelled *Wistaria*. This charmingly graceful vine, the most beautiful of all climbers hardy in temperate regions, was named by the distinguished American botanist, Thomas Nuttall, in 1818 for Caspar Wistar (1761-1818). Dr. Wistar was Professor of anatomy in the University of Pennsylvania. Although there are inconspicuous North American species of *Wisteria*, the commonly known and cultivated species are the Chinese and Japanese wisterias (*W.sinensis* and *W.floribunda*) of which the former was listed in the 1828 Catalogue of William Prince of Flushing, Long Island.

Weigela, also spelled *Weigelia*. This shrub with its clusters of beautiful pink flowers was named for Christian Ehrenfried von Weigel, a German physician and naturalist (1748-1831). He wrote "Observa-



AUGUSTINE HENRY (1857-1930)

tiones botanicae," and other works. *Weigela* often has been referred to the following genus:

Diervilla. *Weigela*. Named for Dierville, or Diererville, a French surgeon who traveled in Canada, 1699-1700, and introduced *Dier-villa Lonicera* into Europe.

Spiraea Thunbergii. A graceful early-flowering shrub, native to Japan and China, and introduced into cultivation about 1863 is another of the many plants named in honor of the Swedish botanist, Thunberg.

Spiraea Vanhouttei. One of the handsomest of the spring-flowering spireas and extensively planted, this shrub honors the memory of Louis van Houtte, an eminent Belgian horticulturist, who was born in 1810 and died in 1876. He traveled extensively in South America and introduced many new plants. In 1845 he founded *Flore des serres*, an important horticultural publication, which ran until 1883. In 1872 he established the famous nurseries at Ghent, which are perhaps the largest in the world, and for which he is best known.

Spiraea Wilsonii. *Spiraea Wilsonii* is given its specific name in honor of the intrepid traveler E. H. Wilson who made expeditions to China from 1899 to 1905 for the Veitch Nurseries in London. Later expeditions to China, Japan and various other eastern countries were made between the years 1906 and 1919 in the interest of the Arnold Arboretum, for which institution he collected many rare and valuable ornamental plants, many of which have been widely distributed in cultivation in Europe and America.

Deutzia. Among the most popular early flowering shrubs are the deutzias. They were named in honor of Johann van der Deutz, alderman of Amsterdam, by the distinguished Swedish botanist Carl Pehr Thunberg, whose friend and patron he was.

Deutzia Lemoinei. This dainty shrub has the added distinction of bearing the name also of Victor Lemoine, the wonderful French nurseryman (1823-1911), who in his world famous nurseries at Nancy worked incessantly in the hybridizing of garden and greenhouse plants, and to such purpose, that there is not a garden today in which the products of the master genius are not familiar friends.

Deutzia Sieboldiana. Philipp Franz von Siebold, for whom this species was named, was a celebrated German naturalist who accompanied the Dutch embassy to Japan as physician and naturalist in 1823, and spent about seven years in scientific researches in that country. After his return he published a number of valuable works, that of most interest to the botanical world being his "Flora japonica", 2 vols. 1835-1870. Many other species have been named for this noted man.

Lonicera Henryi. *Lonicera*, commonly called honeysuckle, derives

its name from Adam Lonicer, or Lonitzer, (1528-1586), a German physician and naturalist. Lonitzer obtained in 1554 the position of official physician of Frankfort, which he occupied thirty-two years. He published several treatises on medicine, and a Latin work on plants, animals and minerals called "Naturalis historiae opus novum" (1551-1555), which was often reprinted. The specific name *Henryi* honors Augustine Henry (1857-1930), who in his younger days collected extensively in Hupeh and Yunnan, provinces of China, demonstrating the richness of the flora of an area hitherto little known to botanists. Later in life he was associated with Henry J. Elwes in their great work, "The trees of Great Britain and Ireland."

Gleditsia. This genus, popularly called the honey-locust, bearing greenish inconspicuous flowers in early summer and large ornamental pods in the autumn, was named for Johann Gottlieb Gleditsch (1714-1786), Director of the Botanic garden at Berlin. It is sometimes spelled *Gleditschia*.

Davidia involucrata. The davidia, a rare tree, appropriately called the "dove tree" because of the large white bracts which surround a globose cluster of tiny flowers, and flutter in the breeze like a dove, has an interesting history. Père Armand David, for whom it is named, was a distinguished missionary and naturalist, who botanized in China from 1862 to 1873. He was one of the pioneer explorers of western China, and contributed largely to our knowledge of the natural history of that country. He entered the congregation of the Lazarists in 1848, was ordained to the priesthood in 1851 and in 1862 was attached to the mission of the Lazarists at Peking, where he soon began to apply himself zealously to the natural history of that country. It was for the purpose of securing seeds of the davidia that E.H. Wilson made his first trip to China.

Robinia. The genus *Robinia* was named in honor of Jean Robin (1550-1629), a French botanist, who was patronized by Henry IV, and planted a garden which was the finest in Paris. He published a work on plants which grow near Paris, "Catalogus stirpium tam indigenarum quam exoticarum," etc. 1601. His son, Vespasien Robin, also a botanist, succeeded his father in the title of *arboriste du roi*, and lectured on botany at the Jardin Royal.

Kolkwitzia. This genus was named by Paul Graebner in honor of Richard Kolkwitz, a professor of botany in Berlin, who died in 1873. Its most charming and popular species is *Kolkwitzia amabilis*, a graceful ornamental shrub, very handsome in spring with its profusely produced pink flowers.

Stewartia, also spelled *Stuartia*. This very desirable ornamental shrub with its large, showy white flowers was named in honor of John Stuart, 3rd Earl of Bute (1713-1792), who took an extremely active

part in developing Kew gardens. He had been "Lord of the bed-chamber to the Prince of Wales, and on his death, became groom of the stole to his son, afterwards George III." In 1761 Lord Bute was made Secretary of State, and from 1762 served as Prime Minister.

Kalmia latifolia. The mountain laurel, the most beautiful of evergreen shrubs native to eastern North America, bears the name of the distinguished Swedish botanist, Pehr Kalm (1715-1779), who in 1748 sailed for America, where he spent three years engaged in the study of natural history. On his return to Sweden, he published an account of his travels under the title "En rese til Norra America," in three volumes, 1753-1761. This is one of the most important accounts of early voyages to America and was translated into several languages.

Albizia. Closely related to the genus *Acacia*, *Albizia* was dedicated to an old and illustrious Italian family, the Albizzi, since a member of that family was one of the first to introduce it into Tuscany. The founder of the genus was Doctor Antonio Durazzini, a Florentine who lived and wrote in the latter half of the 18th century.

Spiraea Douglasii. This spirea honors the memory of Dr. David Douglas, an eminent Scottish botanist, employed as a botanical explorer for the London Horticultural Society. He arrived in California on his second trip to America in 1830. In 1834 he visited the Hawaiian Islands, where he was found killed in a wild-bull pit, under strong suspicion of foul play. *Pseudotsuga taxifolia* is commonly known as the Douglas fir.

Buddleia Davidii honors the memory of two members of the clergy, the English botanist, the Rev. Adam Buddle (1660-1715), who wrote "Methodus nova stirpium britann," and Père Armand David, the French missionary.

Koelreuteria paniculata, or varnish-tree, received its name in compliment to Joseph G. Koelreuter (1733-1806), Professor of natural history at Karlsruhe. It is a native of northern China and was introduced into Petrograd from the neighborhood of Peking some time between 1740 and 1756. In midsummer it is a conspicuous tree, covered with a shower of golden yellow panicles.

Franklinia alatamaha. This exquisite, fall-flowering tree was brought in 1777 from the banks of the Altamaha River in Georgia to Bartram's garden at Philadelphia, and was named by John Bartram in honor of his lifelong friend, Benjamin Franklin. It was later transferred to the genus *Gordonia*, but later still, was found to differ by constant characters so that today *Franklinia* is the generally accepted name. This very attractive plant is now known only from cultivated specimens, no longer occurring in the South as a wild species.

As early botany was closely connected with the study of medicine, the herbals being our earliest works on the subject, it is only natural that a large number of plants should have been dedicated to the memory of physicians.

ETHELYN M. TUCKER

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CURRENT ARBORETUM ACTIVITIES OF GENERAL INTEREST

INTEREST is constantly being shown in the work of the Arnold Arboretum by the gardening public. In order to record for Bulletin readers some of the little known lines of activity, as well as some of the more popularly known, the following condensed statements have been taken from a report made by Dr. E. D. Merrill, Director of the Arboretum, to the Visiting Committee on May 10, 1938. This report covers in general the work accomplished during the last two years and is of interest because it records a few of the many activities that are now in progress.

Public Relations

Our relationships with other institutions, with Harvard University of which the Arboretum is a part, with the several separately endowed institutions of the University, with the City officials and with the general public are excellent. We enjoy the cooperation of the Park Department officials, as well as those of the Police Department and the Fire Department. Two of our regular employees have recently been appointed as special policemen, with power to act within the grounds, for there is some vandalism although it is not alarming or excessive. As an example, virtually all of the narcissus flowers were taken on two successive Sundays from the field near the Administration Building, yet there were no signs of broken branches or flower clusters on the many thousands of shrubs and trees in full flower although police estimates give the number of visitors on a single Sunday as high as 35,000; and last year on Lilac Sunday there were actually more than 40,000 pedestrians in the grounds on that one day. Inspection of the grounds the next morning showed no sign of this flood of visitors ex-

cept the trampling of the grass in the vicinity of attractive plantings; there were no broken plants, no evidence that flowering branches had been taken, and no discarded newspapers or rubbish that one often sees in public parks. The conclusion that one draws is highly complimentary to the Boston public, and especially to the many thousands of individuals who visit and appreciate the Arboretum for what it is —a great living collection of ornamental shrubs and trees.

Last year and the year before we were overwhelmed by bicyclists. Acting on the suggestion of the Police Department, an appeal was made to the Boston Park Commission to prohibit bicycling in the Arboretum. Action was promptly taken and this nuisance was immediately eliminated.

Butler Estate

The Isabel Butler estate was bequeathed to the Arboretum in the early part of 1936, and the property was taken over in May of that year. It consists of approximately two acres of land, an eleven-room, well-constructed residence built about eighty years ago, and a commodious barn. On the acquisition of the property, the Butler place was designated by the University authorities as the official residence of the Director of the Arnold Arboretum. It is admirably located for this purpose, as the grounds adjoin the Arboretum almost immediately back of the Administration Building on the Centre Street side, between the Adams-Nervine property and the convent of the Poor Clares.

The Maria Moors Cabot Foundation for Botanical Research

This new foundation was established in June, 1937, through the gift of Dr. Godfrey L. Cabot of Boston. It forms the ninth separately endowed unit of Harvard University in the botanical field, but is most fortunately in the form of a foundation rather than as an institution. The result is that the income from this new fund can be used to support research in the field specified by Dr. Cabot, by providing assistance to individuals employed by other botanical units, such as the Harvard Forest, the Biological Laboratory, the Arnold Arboretum, and Bussey Institution. The project is essentially a tree breeding one, and one of its objectives is the study of methods whereby a more rapid increase in cellulose production may be devised. The Arboretum is a cooperating agency in the hybridization field, and much work has already been initiated.

Special Grants

Supplementing the regular Arboretum budget very numerous small and large gifts have been received during the year, the combined a-

mount enabling the institution to initiate work in several important fields where budgetary limitations forbade expansion. Besides numerous unrestricted gifts, several special ones are worthy of note. Through grants from the Harvard-Yenching Institute and the Smithsonian Institution, supplemented by a generous gift from an anonymous friend of the Arboretum, the printing of the very large and important Asiatic bibliography was made possible. Other gifts have been made for the care of conifers, special construction, and for lichen research; the latter really finances a research project at the Farlow Reference Library and Herbarium. Dr. Raup of the Arboretum staff has just received a grant from the Milton fund of Harvard University to finance further botanical field work in northwestern Canada in the summer of 1939. The Director of the Arnold Arboretum received in 1936-37 a grant from the same source to initiate work on a critical study of the Bornean species of *Eugenia*, and this year he received a supplementary contribution from the American Philosophical Society to complete the task.

Publications

Through its publications the Arboretum makes itself known to the botanical and horticultural public in all parts of the world. Because of the wise actions of its first director, Dr. Charles Sprague Sargent, who developed it not only as a magnificent planting of hardy trees and shrubs, unequalled in its field anywhere in the world, but also as a research and publishing institution, it has become one of the most widely and favorably known units of Harvard University. It is this combination of factors, and the high grade of its published results that have made the Arboretum great in its several fields.

The Bulletin of Popular Information has been issued regularly, and the mailing list now approximates 1500 in comparison to the subscription list of about 600 in 1935. Each year four numbers of the technical Journal of the Arnold Arboretum have been issued, this being maintained on a strictly subscription and exchange basis. Exchanges received form an important part of our library accessions, and these come from all parts of the world. One number of the Contributions, another technical series, has been issued. Just off the press is the Merrill-Walker "Bibliography of Eastern Asiatic Botany", a quarto volume containing nearly 22,000 author entries in practically all the languages of Europe and covers the period from the beginning of printing, not only in Europe but also in China, as far as the botanical-horticultural fields are concerned; the oldest publication recorded was issued in China in the third century B.C. The area covered extends

from Tibet and Central Asia to Saghalien, Japan, and Formosa. In the press is Mrs. McKelvey's "Yuccas of the southwestern United States", to the preparation of which she has devoted many years of work and has travelled many thousands of miles. Besides these publications actually sponsored by the Arboretum itself, staff members have published thirty-eight technical and semi-technical papers in periodical literature. In all, sixty-six technical papers were published by staff members in 1937. Non-officially Professor Rehder is industriously working on a complete revision of his standard "Manual of Cultivated Trees and Shrubs," and Dr. Wyman has written a standard reference work entitled "Hedges, Windbreaks, and Screens for Every Purpose", to be published late in the summer.

Cooperative Botanical-Horticultural Exploration

Our needs are twofold; seeds and living plants to increase our living collections, and additional botanical material to increase our herbarium reference collections. The economical method of accomplishing field work in certain foreign countries, and in our own for that matter, is to make small grants to individuals who are strategically located and who are trained in methods of field work. Within the past two years numerous small grants have been made; four institutions in India, four in China, and one each in Japan, Burma, the Malay Peninsula, Java, Philippines, Mexico, Colombia, Brazil, Panama, Congo, New Guinea, Idaho, North Carolina, Louisiana, and British Columbia have received grants to be expended to cover the expenses of cooperative field work. In addition to extensive and valuable botanical collections acquired through this plan we have actually received in excess of 2000 packets of seeds from China and Japan alone. These will be distributed to various institutions in Europe and in America in the near future.

Herbarium Exchanges

These cooperative expeditions, maintained at a minimum cost, give us not only a study set of all material collected for our herbarium, but also vast quantities of duplicates for exchange purposes. With this material in hand we have recently developed some most important exchanges with such institutions as the botanical gardens and museums in Leningrad, Geneva, Vienna, London, Prague, Stockholm, and Copenhagen.

Library

The library today is the largest and most important in its field in America, and is one of the great botanical libraries of the world. In the past two years 942 bound volumes were received and accessioned,

and since July 1, 1937, many additional ones have been acquired.

Plants New to the Arboretum Collections

Beginning in 1936 a concerted effort has been made to acquire hardy or presumably hardy species and varieties of woody plants not represented in our living collections. In 1936-37, 171 accessions were procured from Europe and 187 from the United States. In 1937-38, 373 additional species and varieties were obtained from Europe and 493 from the United States. The foreign material was imported under special permits from the Federal Horticultural Board. Most of the American material was received from nurserymen, institutions with which we have exchange relations, and as gifts; Mr. Dexter, a member of our visiting Committee, presented us with a number of fine Rhododendrons new to our collections which we have placed in the more sheltered and warmer parts of the grounds. Mr. Childs Frick, another member of the Visiting Committee, very kindly purchased for the Arboretum a number of fine conifers that were available in European institutions. Two very large shipments were received from Holland and England in April. The grand total is 1224 species and varieties, all new to our living collections; this is by far the largest accession acquired in recent years. All this material is "lined out" in our expanded nursery near the Bussey Institution. It will be distributed among the living collections next fall or in the spring of 1939. We have already located some 500 more species in European nurseries and botanical gardens that we shall make a serious attempt to obtain during the next few years.

To meet our space requirements for this new stock we have greatly expanded the nursery area near the Bussey Institution and are preparing a considerable area in the Walter Street tract to be used as an overflow nursery, in which plants will be lined out and grown until we can decide whether or not they are worthy of inclusion in the permanent Arboretum collections. Here we shall also grow some thousands of hybrids and chance seedlings taken from the Arboretum grounds.

Hedge Plantings

A year ago a series of plantings were made in the open space in front of the Bussey Institution building to be developed as clipped hedges with the purpose of demonstrating in a graphic manner a series of hardy evergreen and deciduous species and varieties adaptable to this purpose. In this planting 115 different species and varieties are represented, and as the plants reach the proper size the actual clipping will be started. All of the plants necessary for this installation

were presented by several of the larger nurseries in the northeastern part of the United States.

The Larz Anderson Collection of Dwarf Japanese Trees

In October, 1937, Mrs. Larz Anderson presented to the Arboretum a collection of 34 dwarf Japanese trees, obtained in 1913 by the Honorable Larz Anderson, then the United States Ambassador to Japan. This gift was made under the condition that the collection be known as "The Larz Anderson collection of Japanese dwarf trees, presented to the Arnold Arboretum as a memorial to his friend, Charles Sprague Sargent." Mrs. Anderson generously provided the funds for the erection of a shade house in which this valuable group of plants is exhibited. (See Bulletin of Popular Information No. 7, 1938).

New Detail Maps

Beginning in 1937 a complete new survey of the Arboretum was made, and detailed maps showing the exact location of each planted tree or shrub will be finished during the present season. (This mapping project was fully described in the Bulletin of Popular Information No. 5, 1938).

Lantern Slides and Moving Pictures in Natural Color

During the past two years the Arboretum has made a very fine set of about 650 slides in natural color and some 2400 feet of 16 mm. moving picture film in natural color, showing the attractive features of the Arboretum at all seasons of the year. Many of the outstanding introductions of the Arboretum are carefully photographed in flower and again fruit and autumn color to illustrate their ornamental characteristics at different times of the year.

Standardized Plant Names

The Arboretum, through Professor Rehder and Dr. Wyman, has cooperated extensively with the American Joint Committee on Horticultural Nomenclature on the preparation of the second edition of this standard work, Dr. Wyman being a member of the Editing Committee. One of the objectives of this committee is to bring horticultural nomenclature closer to botanical usage by the adoption of the International Rules of Botanical Nomenclature. When once available, this work should go a long way toward the unification of nomenclature of cultivated plants both as to their scientific and their common names.

Proposed Innovations

Suggestions were made appertaining to the possible development of a lily pond to occupy a part of what is now a swampy meadow in

front of the Administration Building. In this area, which can scarcely be drained without involving a major and very expensive operation, the water table is so high that no woody plants can be grown. Another idea presented was the possible cooperation with an interested group in New York with the objective of installing a planting of trees and shrubs as a part of the horticultural exhibit planned as a feature of the New York World's Fair in 1939. Such a planting, if developed, would include only specimens of those species actually introduced into the United States or into cultivation by the Arnold Arboretum. A suggestion was also made appertaining to the possible desirability of organizing the supporters of the Arboretum with an informal group to be known perhaps as "The Friends of the Arnold Arboretum."

To quote from the concluding paragraph of Dr. Merrill's report, "For what has been accomplished in the past two years I make no personal claims. Some of the ideas were my own, but much of the execution has been the work of others. To a loyal, interested and efficient staff the institution owes much. Contributions received from over 800 individuals from all over the United States and Canada have enabled the staff to initiate many lines of work that could not be developed and supported by budgetary funds alone. Lastly I wish to extend to the members of this committee my keen appreciation of the support that its various members have extended to the Arboretum, for after all it is "the father of them all" in Arboretum circles, not only in the United States, but in all other countries as well, in spite of the fact that it is now only sixty-six years old."

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ARNOLD ARBORETUM

HARVARD UNIVERSITY



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CYTISUS FOR NEW ENGLAND

AMONG the species of *Cytisus* are many plants that are only semi-hardy in New England, yet they are so colorful that they should always be considered when there is any possibility of their coming through the winter in good condition. In the first place, they are valuable assets to gardens because of their bright yellow flowers, although there are several with white, purple, or pale lemon-yellow flowers. Secondly, they add interest because their stems remain green all winter. Finally, they are of value because they are legumes and the nitrogen bearing nodules which form on their roots enrich the soil.

They are not difficult to grow, and many may be raised readily from seed. However they cannot be expected to survive every winter, and even in protected situations in the Arboretum some are killed to the ground during the very severe winters. A little south of Boston, on Cape Cod, they prove much hardier and splendid specimens may be seen. Even some of the beautiful flowering hybrids, so common in England, are seen here and there in Cape Cod and Newport gardens. In New England there are some species of particular interest, and a few of the better ones are listed below.

***Cytisus scoparius*.** This is the most common broom native of Europe and is the only one native to the British Isles. It is said to have been brought to this country as early as Captain John Smith's time by one of the early Virginia settlers, and it is well adapted to the eastern United States where it has escaped cultivation in several places, being particularly abundant in Nantucket. The Scotch broom is a bushy shrub which may grow 5 to 6 feet tall, although in the east it is considerably smaller because it is so often killed back by severe winters. The large pea-like flowers are colored a deep golden yellow and appear in May. The twigs are upright and green all winter. The name "broom" comes from the fact that there are so many upright twigs

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that it is a comparatively simple matter to cut them off in large bunches, tie them together, and use them as a rough broom. There are several varieties growing in the Arboretum and many more in Europe. Among the most outstanding is var. *Andreanus* which is similar to the species in every way, except that the wing-petals and the standard petal are a rich brownish-crimson, adding considerably to the beauty of the flower.

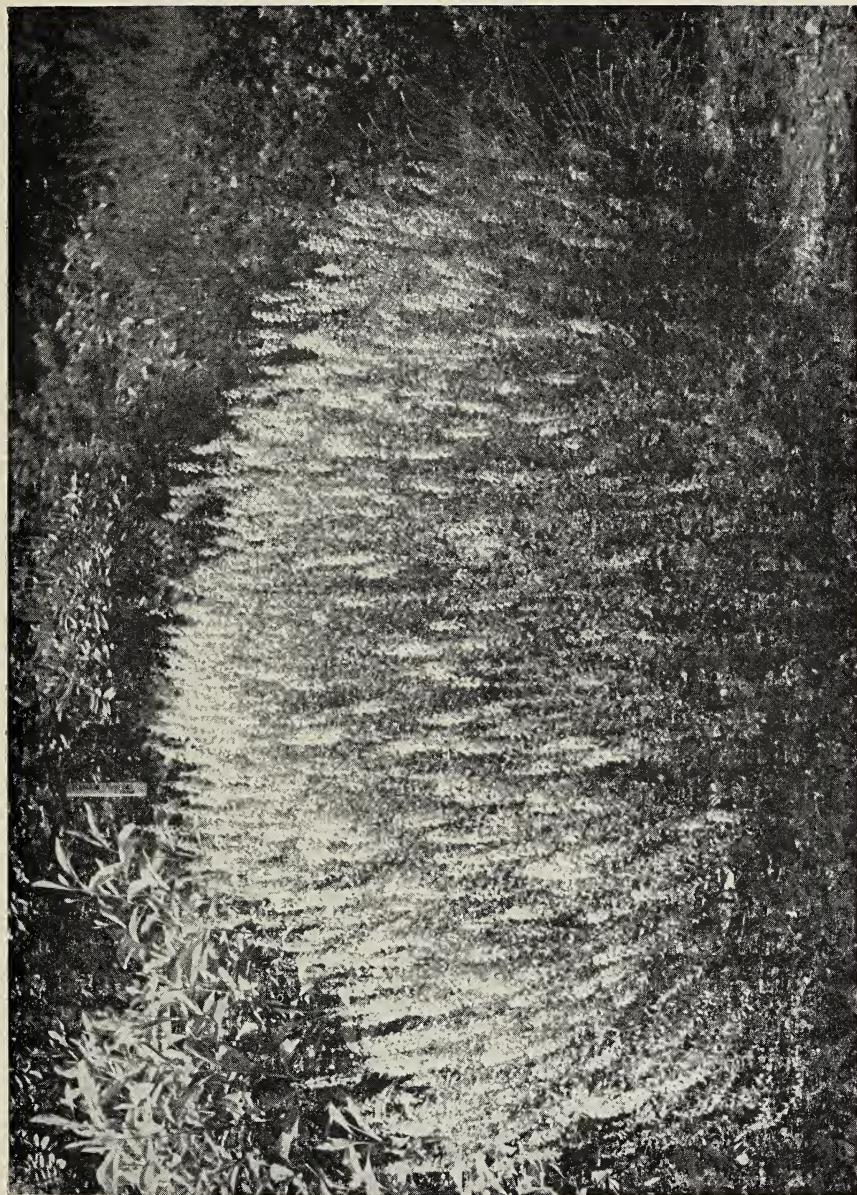
There is also a double-flowered variety, as well as one (var. *pendulus*) with graceful pendulous branches, and one (var. *albus*) with pale yellow or nearly white flowers. These varieties are best propagated asexually, either by grafting on *Laburnum* stock or by cuttings taken in late August.

Cytisus nigricans. This species is a native of central and southeastern Europe and is in bloom at present in the Arboretum. It was highly recommended by Professor Sargent and E. H. Wilson because it never fails to bloom; each year it is covered with long terminal spikes of bright yellow flowers. In fact, it is easily recognized by these spikes when in bloom, for it is the only broom that blossoms during July and August that has these conspicuous flower spikes. Because it flowers on the growth made during the current year, any necessary pruning should always be done before growth starts in the early spring. When the blooming has ceased, the flower stalks might be removed to prevent seeding and so conserve the energy of the plant for vegetative growth. Because the flowers of this particular species turn black when dried, Linnaeus gave it the specific name *nigricans*. It has been growing in the Arboretum since 1906 and consistently has produced large numbers of flower spikes in the early summer. Wherever summer bloom is desired, this splendid ornamental should have its place.

Cytisus praecox. During the past two years the Warminster broom has been conspicuous in the collection on the top of Bussey Hill where many fine specimens are growing. In the spring this plant is the most conspicuous in the entire Cytisus collection and has proved to be one of the most popular with Arboretum visitors. The bushes are covered with very pale, lemon-yellow flowers, an easy reminder to even the casual observer that there are few woody plants blessed with this unusual shade of yellow. The species is a hybrid between *C. multiflorus* and *C. purgans* and is called the Warminster broom, for it first appeared in the nursery of Wheeler of Warminster in England about 1867. Today it is available from one or two nurseries in this country. Because it does not come true from seed, it should be propagated by cuttings taken in August.

Its very dense habit of growth and slender, erect branches appear very graceful even in the slightest breeze. In the Arboretum the plants are about 3 feet tall, and when covered with pale yellow flowers they are a most pleasing spectacle.

PLATE XI
Cytisus nigricans, the spike broom.



Cytisus purpureus. This procumbent shrub seldom grows over $1\frac{1}{2}$ feet tall and in May it is highly valued for its purple flowers which are borne on the growth made the previous year. The branches often arch gracefully from the base of the plant, making a dense, slightly rounded mass of purple flowers. Unusual among the brooms because of its purple flowers, this species is one of the best of the low brooms. A white flowered variety (*alba*) is another valued ornamental.

Other hardy species of note are *C. ratisbonensis* with yellow flowers borne along its arching branches (a native of Europe, particularly abundant in Hungary and the Balkans where it occasionally grows as tall as 6 feet), one of the hardiest of the brooms in the collection at the Arboretum, *C. austriacus* with its flowers in heads at the end of upright branches, and *C. albus* which is similar but has white flowers.

Dwarf Brooms. For planting on sunny banks or on top of exposed rocks *Cytisus purgans*, *C. Ardoini*, *C. Beanii*, and *C. decumbens* are admirably suited. All are prostrate with numerous, slender radiating branches which form masses of color near the ground. The best is *C. Beanii*, a chance hybrid between *C. Ardoini* and *C. purgans*, with large deep golden-yellow flowers borne singly or in pairs from each joint of the previous year's growth. This plant blossoms so freely that the twigs and leaves are frequently hidden by the wealth of flowers. It is quite hardy in the Arboretum even though one of its parents, *C. Ardoini*, is not. *Cytisus decumbens*, with its bright yellow flowers in clusters along the shoots, is perhaps the most prostrate of all.

The growing season this year has been very long due to the abundant rains and comparatively cool weather. Most of the shrubs and trees show splendid growth and many a vigorous secondary growth. The moist weather has caused leaf and twig blight disease on the plane trees, and unfortunately this same disease had made headway on a few of the white oaks. Another year a definite attempt will be made to control this disease by spraying with Bordeaux mixture during the growing season. Although the winter was mild, considerable winter injury was noted in the shrub collection, where many plants, even *Kolkwitzia amabilis*, were killed to the ground, whereas on higher ground other plants of the same species and varieties remained uninjured. The exact cause of such injury is difficult to explain, but probably was due to the sudden cold spells during early March, particularly on nights when there was little wind.

Cumulative index of the Bulletin of Popular Information. It has been suggested that a cumulative index of the Bulletin be published for the years 1916-38 inclusive. This would help readers who consult back numbers. The publication of such an index would take considerable time, but if Bulletin readers would like to have it, it can in all probability be done. Please write to the Bulletin of Popular Information expressing your views on this subject.

DONALD WYMAN

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ARNOLD ARBORETUM
HARVARD UNIVERSITY



BULLETIN
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SERIES 4. VOL. VI

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NUMBER 11

NARROW UPRIGHT TREES IN THE ARNOLD ARBORETUM

THE Lombardy poplar has earned a bad name for itself among plantsmen in general, and in many localities ordinances have been passed restricting its use. However, because it is a rapid grower and is available from almost every nursery, it will continue to be used in certain locations. What are some of the possible substitutes for it? It is extremely interesting to note that there are at least 43 different species and varieties of trees actually growing in the Arnold Arboretum now which might be used in its place, and these do not exhaust the list of possibilities by any means. There are many others which, if noted, would make this list surprisingly long.

It is an easy task to make note of unusual trees growing at various places over a wide area, but with specimen trees in one particular place and others several miles distant, it is rather difficult to make direct comparisons. For the purposes of this Bulletin it has been considered advisable to publish the list of those species and varieties with narrow erect crowns actually growing in the Arboretum, for this list alone is sufficiently large to be impressive. The Arboretum will be glad to know of other forms and will appreciate receiving information and photographs of other unusual varieties representing these unusual growth forms so that a fairly comprehensive list with accurate notations can be assembled.

Unfortunately, there is not a sufficient demand on the part of the public to make it profitable for nurserymen to grow these plants in large numbers; that is why some are almost unobtainable in the trade. All the trees in the list are not of outstanding value. Some are far superior to others, as for instance the upright form of the European

beech which is a distinctly more valued ornamental than is the upright form of the American linden.

There are interesting stories connected with the origin of many of these special forms. The beech came from the Scottish estate of F. R. S. Balfour; the Norway maple originated in Rochester, New York, and is now being propagated there for use as a street tree. The sentry maple (*Acer saccharum monumentale*) came from a Boston suburb over fifty years ago. The others originated in widely separated parts of this country and Europe.

Each plant has its own peculiarity. *Acer saccharum monumentale* is a very narrow and upright tree, while *A. rubrum columnare* has a considerably wider crown, although it can be classed as upright. Then, too, these trees vary in their growth rate. The sugar maples are slow in growth, the red maple a little faster, and the poplars, of course, are the fastest. Some, like the hornbeams make splendid lawn specimens, but the maples soon outgrow their usefulness unless the lawn is very large. Because of their clearly defined shape, all might be considered as possibilities for use in formal plantings.

Unfortunately, the nomenclature is somewhat confused, and as a result we have received duplicate plants under several different names, time and time again. The following plants now growing in the Arboretum are listed according to their accepted scientific names:

Narrow upright trees in the Arnold Arboretum

- Abies alba pyramidalis (*A. pectinata pyramidalis*)
- Acer platanoides columnare
- Acer platanoides erectum
- Acer rubrum columnare
- Acer saccharinum pyramidale
- Acer saccharum monumentale (*A. saccharum columnare*, *A. saccharum pyramidale*)
- Aesculus Hippocastanum pyramidalis
- Betula pendula fastigiata (*Betula alba fastigiata*)
- Carpinus Betulus fastigiata (*Carpinus Betulus pyramidalis*)
- Crataegus monogyna stricta (*C. oxyacantha stricta*)
- Crataegus Phaenopyrum fastigiata
- Fagus sylvatica fastigiata (*F. sylvatica Dawyckii*)
- Ginkgo biloba fastigiata
- Juniperus chinensis mäs
- Juniperus communis hibernica
- Juniperus communis suecica

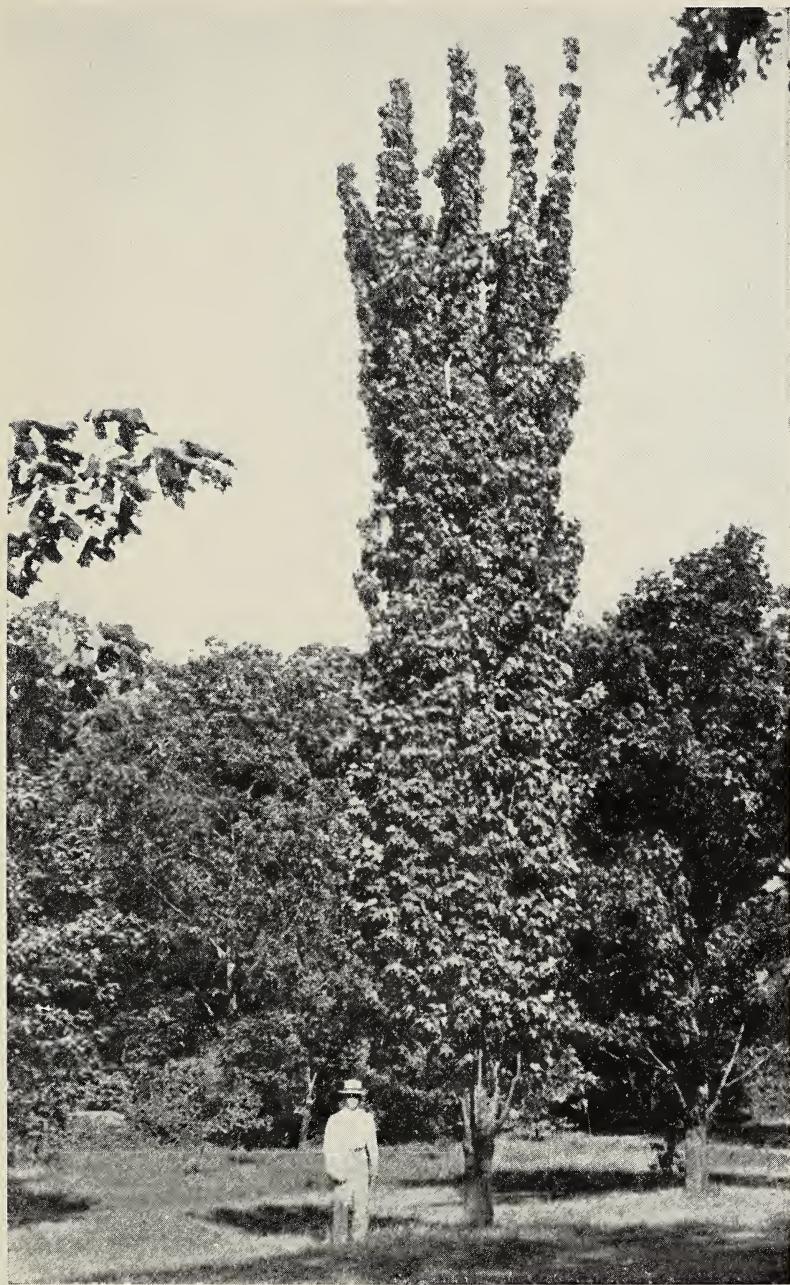


PLATE XII
Acer saccharum monumentale, sentry maple

Juniperus virginiana fastigiata
Juniperus virginiana pyramidalis
Liriodendron Tulipifera pyramidale (*L. Tulipifera fastigiatum*)
Morus alba pyramidalis (*M. alba fastigiata*)
Picea Engelmanni fastigiata
Pinus cembra
Pinus Strobus fastigiata
Pinus sylvestris fastigiata
Populus alba pyramidalis (*P. alba Boleana*)
Populus nigra italica
Populus nigra plantierensis
Populus nigra thevestina
Populus Simonii fastigiata
Quercus robur fastigiata
Robinia Pseudoacacia erecta
Taxus media Hicksii (*T. cuspidata Hicksii*)
Thuja occidentalis Douglasii pyramidalis
Tilia americana columnaris (*T. glabra columnaris*)
Tilia platyphyllos fastigiata (*T. platyphyllos pyramidalis*)
Ulmus americana ascendens
Ulmus americana columnaris
Ulmus americana "Moline Elm"
Ulmus carpinifolia cornubiensis (*U. foliacea stricta*)
Ulmus carpinifolia Dampieri (*U. foliacea Dampieri*)
Ulmus carpinifolia sarinensis (*U. foliacea Wheatleyi*)
Ulmus glabra exoniensis (*U. montana fastigiata*)
Ulmus hollandica "Klemmer"

DONALD WYMAN

Large seed collection imported by Arboretum during summer

In February 1937, the Arnold Arboretum made a small grant to the Fan Memorial Institute of Biology, Peiping, China, to help finance a horticultural-botanical expedition to Yunnan Province. This expedition was in part supported by a grant from the Royal Botanic Garden, Edinburgh. The fieldwork was done by Mr. Te-Tsun Yü, the results, as to quantity and quality of the material secured, being surprisingly good. The Arnold Arboretum's share of the seeds collected approximate 2000 numbers. The Royal Botanic Garden, Edinburgh, received a similar shipment, as the seeds secured under each number were divided between the two institutions. Sir William Wright Smith, Director of the Edinburgh institution, states that he doubts whether



PLATE XIII
Acer rubrum columnare

any similar collections so ample in quantity and of such fine quality have ever been secured before in China by any single expedition.

As far as the Arnold Arboretum is concerned, it is fully realized that none of the species represented in this enormous Yunnan collection will withstand the rigors of the Boston climate. The institution, however, has from the beginning of its career sponsored the introduction of exotic species into the United States, and has given its introduction wide distribution.

In accordance with this principle, this great Yunnan seed collection has been divided into sets, approximating 12,000 seed packets. These have been distributed to strategically located institutions in the United States, Great Britain, Belgium, France, Germany and Italy; institutions so situated that it is hoped that these Yunnan species, once established within their grounds, may thrive. Excess stock in very considerable quantities has been turned over to the Seed and Plant Introduction Division of the United States Department of Agriculture, and herbaceous material to the Massachusetts Horticultural Society, for distribution to its membership.

The nine large parcel post packages containing these seeds were forwarded to the Arnold Arboretum in three separate shipments from Yunnan-sen. A set of corresponding botanical specimens has also been received.

This is an excellent example of cooperative fieldwork that has recently been developed at the Arnold Arboretum, whereby from unrestricted special funds received from its friends and supporters small grants are made to strategically located institutions and individuals to cover the actual cost of field work. Thus for less than it would have cost the Arnold Arboretum to send a staff member half way around the world, provide for his salary, travel and field expenses, it has been possible to finance, in the past two years, through these small grants, about twenty-five parties for work in China, Japan, India, Burma, the Malay Peninsula, Java, the Philippines, New Guinea, Colombia, British Columbia, Brazil, Mexico, Argentina, North Carolina, Louisiana, Washington, and Oregon. In some countries grants have been made to several different institutions. The amount of material now being received will tax the efforts of the limited staff of the Arnold Arboretum to the utmost, to give it proper attention, to complete the necessary identifications, and to publish the results. The essential reference collections of the Arnold Arboretum are being rapidly increased with a great quantity of most desirable material, and at a remarkably low cost.

Notes

Professor Alfred Rehder celebrated his 75th birthday on September 4, 1938. In appreciation of his conspicuous services over a period of 40 years to the Arnold Arboretum, to horticulture, dendrology, systematic botany and botanical bibliography, the staff tendered a dinner to him and to Mrs. Rehder on the evening of September first. This was attended by thirty-one individuals. During the course of the dinner, Professor Rehder was presented with a substantial purse provided by members of the committee appointed by the Corporation of Harvard University to visit the Arnold Arboretum, and his associates. It is worthy of note that Professor Rehder's original appointment on the staff of the Arboretum in 1898 was at the rate of \$1.00 per day as what was then called a "working student", and his first task was to eliminate the weeds in the then newly established shrub collection by the vigorous use of a hoe. One unique feature of the dinner was the table decorations which were all sprays of plants actually named and described by Professor Rehder.

At the opening ceremony of the fifteenth International Geographical Congress, Amsterdam, July 18, 1938, Dr. E. D. Merrill, Director of the Arnold Arboretum, was elected an honorary member of the Royal Dutch Geographical Society for his investigations in plant geography. The other American scientist so honored was Dr. C. O. Sauer, Professor of Geography, University of California.

**Preliminary report on the storm damage to the Arboretum on
September twenty-first**

In the late afternoon and early evening of September twenty-first, the Boston area experienced its worst wind storm since weather records have been maintained. This was a West Indian ~~h~~urricane that proceeded northward along the New England coast. The rainfall was relatively slight in Boston, but the wind velocities at times reached approximately (87 miles actually reported) 90 miles per hour. The undersigned spent twenty-two years in the Philippines, a region noted for its numerous destructive typhoons, yet in this entire period he actually experienced higher wind velocities only two or three times. Naturally tremendous property damage resulted, and literally hundreds of thousands of trees were uprooted or so badly damaged that they will have to be removed and replaced. The Arboretum suffered severely.

The storm was intense at 5:00 p.m. and gradually increased in violence. The worst damage was done in the Arboretum between about 5:30 p.m. and 6:30 p.m. A tour of the grounds at 5:30 p.m. revealed relatively slight damage; for example there were only three or four trees in the extensive pine grove back of the Administration Building that were down or showed signs of weakening at that time; an hour later nearly all the trees in the entire planting were prostrate. The sound of rustling leaves, breaking branches, and creaking trunks was at times almost deafening. The worst of the storm was over by 8:00 p.m.

A hurried survey made early the next morning shows that approximately 1500 trees were either uprooted, broken off, or their tops so badly damaged that they will have to be removed. Many others were injured, but can be saved by judicious pruning. The losses include some of the oldest and largest trees in the Arboretum, as well as some of the rarest ones. Some of the roads were impassable, and all paths and roads were strewn with debris, broken branches, and fallen trunks. Damage was particularly serious in certain exposed areas, notably on the slopes back of the Administration Building, on the southeast or exposed side of hemlock hill, where scores of century old native hemlocks fell, in the southern part of the pinetum, where many of the largest pines, firs, and spruces are prostrate, and along the southeast side of the Peters hill area, particularly in the collections of poplars and oaks.

This is the greatest single catastrophe that has happened to the plantings in the Arboretum since its establishment in 1872. It will take many years to repair the damage, for in many cases old mature trees must be replaced by young ones. It is planned to publish a more comprehensive report on the storm damage at a later date.

E. D. MERRILL

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ARNOLD ARBORETUM
HARVARD UNIVERSITY



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HURRICANE DAMAGE AT THE ARBORETUM

RAIN had been falling rather consistently for four days when on September twenty-first, over large areas in New England, the downpour assumed the proportions of a deluge. Rivers in western Massachusetts were at flood stage, and everywhere the ground was soggy from excessive rain. By late afternoon the rain slackened and the wind increased to a gale. At 4:50 p.m. when the lights went out in the Administration Building staff members expected a "blow", but certainly did not anticipate the hurricane which caused frightful damage throughout New England. The Arboretum lost approximately 1500 trees, and a recent newspaper estimate of the number of trees lost in Massachusetts—only one of the New England states touched by the storm—reached the appalling figure of 100,000,000. There is no way of checking such an estimate, but with definite information concerning the number of trees destroyed in a few Boston suburbs, this figure seems possible.

This ruinous hurricane originated in the Caribbean Sea, a veritable hotbed for such storms. Ordinarily, such a malignant manifestation of Nature's power spends itself before reaching the North Atlantic States or else passes out to sea. For some reason, this particular storm chose to follow an unusual course. The U. S. Weather Bureau first reported it a few hundred miles northeast of Puerto Rico. At that time it was moving at the rate of about 17 miles an hour in the direction of the Bahamas and Florida where preparations were being made for its arrival. Strangely enough, it did not touch Florida, but took an unexpected turn to the northeast, aiming its fury at some point off the Carolina coast.

On Wednesday morning the storm was charted off Cape Hatteras, and meteorologists believed that it would continue its curve out to sea where it would spend itself harmlessly as most hurricanes fortunately do. Instead the storm changed its course a second time, and with increasing velocity headed directly up the Atlantic coast. This second turn might have been reported except for one ironic fact. Governmental agencies had done a thorough piece of work in sending out warnings to ships so that there was no vessel in its path to report this most recent

deviation from the storm's expected course. All ships had either sailed far out to sea or else stayed in port. Consequently when the storm travelling at the rate of 60 miles an hour, struck the coast off Atlantic City, no ships were in its path to report the change of direction.

The Blue Hills Observatory of Harvard University is approximately $5\frac{1}{2}$ miles south of the Arboretum. Because of its situation on a high hill, gusts of wind were measured at the observatory during the height of the storm blowing in excess of 150 miles an hour. Wind velocities of 111 miles an hour were measured there in three five-minute periods, 6:05 p.m., 6:20 p.m., and 7:12 p.m. The wind averaged above 60 miles an hour shortly after 4:00 p.m. and remained above that figure until 7:45 p.m. The official high for wind velocity in the Boston area during this storm was given by the U. S. Weather Bureau as 87 miles an hour at 5:23 p.m. The much higher figures at the Blue Hills Observatory were "due apparently to the Hill's so obstructing the free flow of wind that it has to flow over the top at a higher rate." It is safe to assume that wind velocities probably in excess of 100 miles an hour were experienced in certain exposed portions of the Arboretum.

Hemlock Hill in the Arboretum is one of the higher points between Boston and the Blue Hills. With wind velocities at times approximating 125 miles an hour it is understandable that great damage was done to the particular plantings on the southern or exposed side and top of that hill. To the older friends of the Arboretum, this damage will seem the most serious. Part of the old stand of native hemlock is absolutely flattened, the trees now forming a mass of broken timber that will take months to clean away. Fortunately, most of the hemlocks on the lee side of the hill are still standing, particularly those at the rear of the rhododendron collection, so that they will still form a good background for the ericaceous plants when the latter are in bloom.

The beautiful collection of evergreen trees and some of the magnolias at the rear of the Administration Building are almost complete wrecks. The older poplar collection, between Peter's Hill and the railroad has been practically leveled, and the charming plantation of red and white pine on the southeast slope of Bussey Hill is a mass of fallen timber.

Several hundred-year old specimen trees crashed to the ground during the height of the storm, but fortunately there is still a bright side to all this devastation. By actual count, there are only a dozen plants which have been uprooted that are not duplicated elsewhere in the collections. Most of our highly prized specimen trees are still in perfect condition. Of approximately 1500 trees blown down or very badly wrecked, a few have been pulled back into position, since it was usually the larger trees which were blown over. By far the majority of injured or destroyed trees were native in the Arboretum, trees which added materially to the natural beauty of the plantings, but which were not prominent in the collections.

Many of the trees which blew over would probably have remained firmly in the ground if it had not been for the heavy rains preceding the storm, but in such a case, breakage might have been greater.

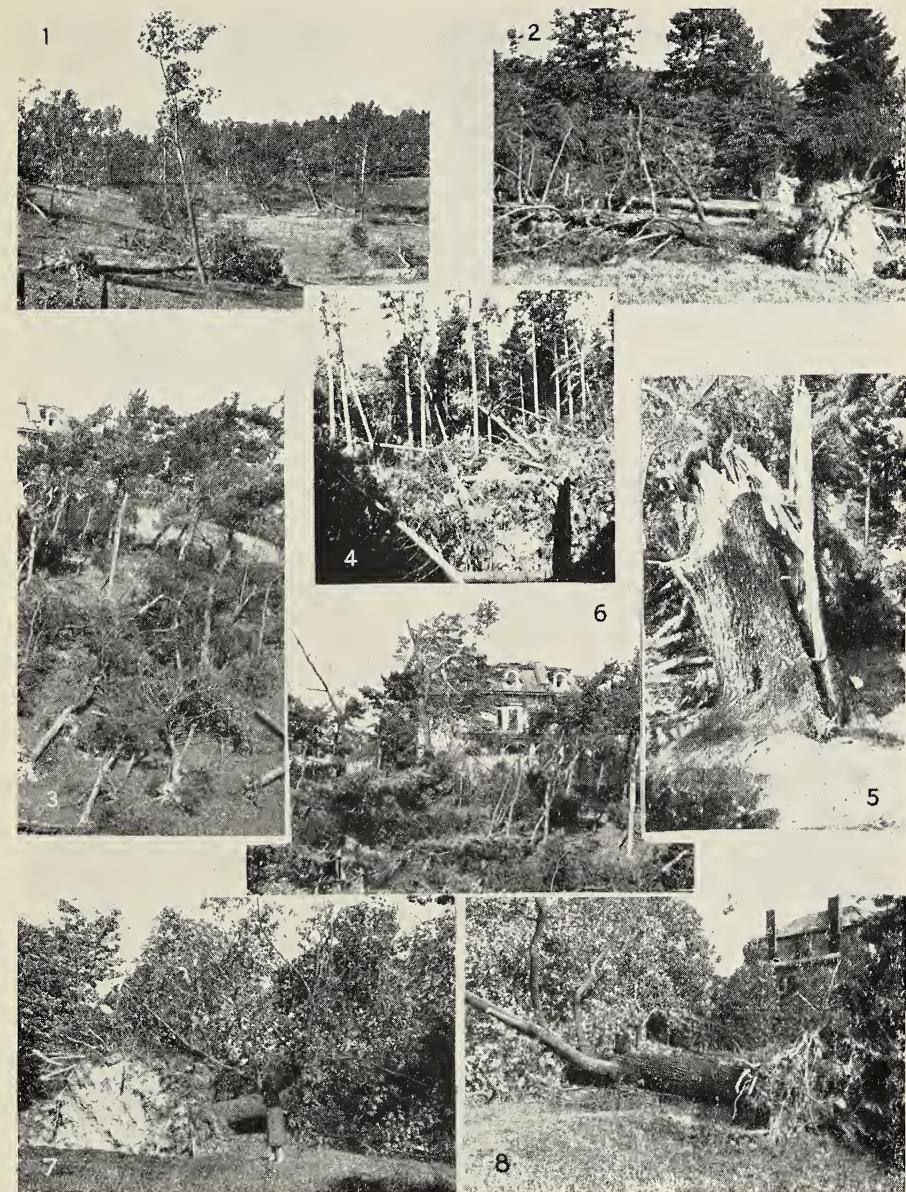


PLATE XIV

Views of hurricane damage in Arboretum 1938

1. The old poplar collection. 2. In the conifer collection.
3. At rear of Administration Building. 4. Hemlock Hill. 5. Remains of a stately pine.
6. At rear of Administration Building. 7. A fallen pin oak. 8. A century old tulip poplar.

Approximate numbers of trees lost.

Hemlocks, oaks, etc. on Hemlock Hill	400
Pines, poplars, magnolias, etc. at rear of Administration Building	200
Conifers in conifer collection	130
Red and white pines between the Overlook and South Street	100
Poplars and oaks on Peter's Hill	60
Miscellaneous trees on Peter's Hill	200
Pyrus, Malus, etc. at Forest Hills gate	50
Miscellaneous trees elsewhere in the Arboretum	350

This was not Boston's first hurricane. The last one occurred 123 years ago on September 23, 1815* and from various newspaper reports at the time was almost as devastating as the recent one. Many Boston buildings were "unroofed" or "unslated", and the Common suffered almost as much as it did this time. Twenty trees on the Common were "torn up by the roots and prostrated" carrying fences with them. Five thousand fruit and forest trees in Dorchester alone were ruined. As with the present hurricane, the damage in and around Boston was nothing compared to what it was in Providence where \$5,000,000 worth of damage was done, which in those days represented very much higher values.

The Arboretum has suffered and suffered badly. It will take months to clear away the wreckage, and many years to grow plants to take the places of the mature ones lost. Nevertheless, the damage might have been much worse. After all, striking damage is limited to a few exposed areas. Individuals intimately acquainted with the Arboretum plantings will note trees lacking here and there in the grounds. Those who occasionally visit the institution, after the winter cleanup is completed will notice few changes. The conspicuously beautiful landscape features for the most part remain essentially unchanged.

The Arboretum staff is industriously engaged in a general rehabilitation plan, and work will be continued throughout the winter. The extra expense involved has been covered by an authorized withdrawal of funds from the institution's fortunately good credit balance. It is, however, practically impossible for us to continue the normal seasonal work of planting, pruning, fertilizing, etc. when we are faced with the immediate problem of removing the remains of between 1400 and 1500 trees.

Notes

By the will of the late Miss Grace M. Edwards of Beacon Street, Boston, \$25,000 was bequeathed the President and Fellows of Harvard University for the benefit of the Arnold Arboretum, this sum to be added to its endowment.

Home owners who have suffered the loss of trees due to the recent hurricane can claim such losses in their next income tax returns, according to expert legal advice on the subject. Although many an old specimen tree that fell during the storm is irreplaceable in dollars and cents, nevertheless the claiming of such a loss in the next income tax report might help compensate in a very small way.

DONALD WYMAN

*Farrar, John. An account of a violent storm of the 23d of September, 1815. *American Acad. of Arts & Sciences* (First Series) Vol. IV; 92, 1818.

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ARNOLD ARBORETUM
HARVARD UNIVERSITY



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THE DUTCH ELM DISEASE SITUATION IN THE UNITED STATES
AT THE CLOSE OF 1938

SINCE the discovery of the Dutch elm disease in the United States in 1929, small infected spots have been found in Ohio, Indiana, Maryland, Virginia, Pennsylvania and eastern Connecticut, and a large infected area 50 to 60 miles in radius out from and including New York City. Eradication of the disease has been accomplished or is proceeding satisfactorily in all except the New York area. There the work is dragging. This is disturbing, because on the outcome of that part of the undertaking depends the future of America's elms. In order to get an independent, close-up view of the situation a visit was made to the New York area, September 15-17, 1938, by myself and Dr. J. S. Boyce, Professor of Forest Pathology, Yale University. We examined the maps and records of the Dutch Elm Disease Eradication Offices, interviewed Federal and State officials in charge and looked over a few critical parts of the field. Important findings are summarized below.

I. Present status of the Dutch Elm Disease in Connecticut, New York and New Jersey.

In the southwestern part of CONNECTICUT where the disease has been severe, there now appears to be some reduction as a result of intensive eradication and sanitation. Elsewhere there is no significant extension; but there are new scattered cases, in many instances miles removed from one another. The explanation of these cases is not clear, but they may be accounted for in part by the chance flight of Scolytus beetles, and in part by the local transfer of affected elm wood. It would seem that State restrictions governing the maintenance of wood piles containing elm logs and the transportation of unpeeled elm wood could be improved; or existing restrictions more rigorously enforced. It is incongruous that we should exclude foreign wood for fear of infection and, at the same time, not restrict local transportation.

In a considerable part of the infected region in NEW YORK STATE outstanding progress has been made in the eradication of the Dutch elm disease.

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OCT 21 1938

This applies particularly to Westchester County and the area to the south. For example, in Greater New York City, where there were 1264 cases in 1933-34, only 55 cases were found in 1938. There was a reduction of more than 25% in the area from White Plains southward in 1937, and there will be a further drop of about 35% in 1938 as compared with 1937. The success in New York State is in part explained by the efficient cooperation extended by the State. Thus, the State scouts give a normal week's work; the personnel is fairly continuous from year to year; each group of scouts operates in its own district year after year; these scouts have become fully acquainted with the sections in which they work; moreover, they are picked men.

One disturbing feature in New York State is the discovery during the past summer of the disease in Dutchess County. This will mean an extension of effort but probably not to such an extent as to threaten the success of the eradication program.

There has been no significant spread of the disease in NEW JERSEY in 1938 as compared with 1937. Control of further spread in New Jersey will be facilitated by the fact that the infected area is now bounded by natural barriers. In some parts there has been a considerable reduction in the amount of the disease as a result of eradication and sanitation. The large increase reported for New Jersey this year is related to silvicide operations. In certain regions half a million elms were recently killed by a silvicide process applied for the purpose of eliminating areas in which scouting is difficult and the elms of little value. The resulting dead trees have unexpectedly served as breeding places for *Scolytus*. It is around these areas that the increase in the disease has occurred. For example, adjacent to a silvicide area in the town of Clinton the number of diseased elms this year is 225 as compared with 4 in 1937; in Montgomery, 75 as compared with one in 1937; in Hopewell to Hillsborough, 2160 as compared with 23 in 1937. These occurrences, while distressing, are probably not alarming. The silvicide areas will now be out of the picture. The further breeding of *Scolytus* in them will cease. The number of affected elms adjacent to them will drop off sharply.

II. Disabilities that should be removed.

1. Funds have not been available early enough in the year nor with sufficient continuity. The result this year has been that systematic scouting was not possible before July 9. June is the best month for scouting and it should be begun in the latter part of May.

2. As a result of irregularity and uncertainty with respect to the availability of funds, the field forces have again and again been demoralized at critical periods.

3. The quality of the field forces, welfare recipients, has been distinctly inferior for scouting purposes. This applies to a considerable proportion of the foremen and a large percentage of the men under them.

4. Under the present system the scouting forces have had to be continually reorganized; hence much effort has been sacrificed because of the loss of experienced men and the necessity of giving time during the season to instruction of their replacements.



PLATE XV
A stately American elm.

5. As business improves the quality of available men drawn from welfare agencies and assigned to the eradication project has been and will be continuously on the down grade.

6. Under the present set-up there are complications with respect to the transfer of men from one town to another. In other words, it is sometimes impossible either to secure or place men where they are needed.

7. The work hours are too short at present; men on welfare are working about 113 hours a month instead of about the 190 hours which would prevail under normal conditions of employment.

8. Most of the men now employed are city men. They generally dislike the work and many of them are afraid and helpless in wooded tracts.

9. Many estate owners have become disgusted with the kind of men that are being sent in to scout and work on their properties and do not want them on their grounds.

10. These disabilities react on the spirit of the responsible officers and, in consequence, they feel that, if continued, the possibility of eradication is threatened or at least indefinitely postponed.

III. Comments.

1. Scouting should be organized and carried on without relation to welfare work.

2. The employment of W.P.A. workers should be restricted mainly to the sanitation part of the program.

3. Special attention should be given to the outer limits of the Dutch elm disease area in the states of New York and Connecticut so as to prevent the spread of the disease into contiguous regions in which the elm population is dense and important. A much further spread will spell doom to America's elms.

4. In formulating the program for 1939, the damage done to elms within the infected areas by the hurricane of September 21 will have to be taken into consideration.

As a result of the fear aroused by the Dutch elm disease situation in America, some people have come to question the advisability of planting elms. The answer, especially for the eastern part of the country, is reached through an appraisal of the prospect that the disease will be eliminated. In my judgment we can safely continue to plant elms. It is unthinkable, in view of the demonstrated possibilities of success in eradication, that the American people will abandon efforts to save one of the finest gifts of Nature. Given the opportunity, I still think we can preserve our elms. But provision for that opportunity rests immediately on Federal and State governments, and primarily on the insistence brought to bear by the public on those who represent them in those governments. The cost to try to save our elms is relatively small. On the other hand, if we let them go, the costs will be greater to this generation, and a noble heritage will no longer be ours to pass on to succeeding generations. Everyone can help at the moment by urgent spoken or written words, and now is the critical time for action.

J. H. FAULL

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ARNOLD ARBORETUM
HARVARD UNIVERSITY



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NUMBER 14

THE HEDGE DEMONSTRATION PLOT AT THE
ARNOLD ARBORETUM

IN THE fall of 1936 an extensive plot of experimental hedges was planted at the Arboretum. Because of the necessary formality of the planting, it was not laid out near any of the lovely informal plantings so enjoyed by the public. Instead it was set off from the rest of the Arboretum on ground formerly belonging to the Bussey Institution. At present there are 112 different kinds of hedges, and two more will be added next spring.

In a new book just published* (**Hedges, Screens, and Windbreaks, their uses, selection, and care**), 250 plants are listed as suitable for different types of hedges. Not all are perfectly adaptable to this use, but a large number of them are. It is of considerable value to study such a large number of hedges when they are growing within close proximity under the same general conditions. The foliage of certain ones is rather coarse in texture; while the foliage of others is comparatively fine. Some grow vigorously and should be used only for tall hedges and screens, while others can be easily restrained to form excellent low and even dwarf hedges.

The oldest hedge experiments in the western hemisphere are those at the Dominion Experimental Farm, Ottawa, Canada, where some of the plantings are over fifty years old. In the United States, the Morton Arboretum and Cornell University have the only other extensive experimental plots. Fortunately, some of the state experiment stations have realized the value of hedge demonstrations and some have already planted a number of excellent hedges.

*Wyman, Donald, *Hedges, screens and windbreaks; their uses, selection and care*. New York; Lond. 1938. 8°. pp. xviii, 249. Map plates. (McGraw-Hill Book Co.)

Each hedge at the Arnold Arboretum is 25 feet long. They are arranged in a semi-circular plot of ground in front of the old Bussey Building with sufficient distance between each hedge to allow ample room for growth. The taller growing hedges have been given more space than the lower growing ones. Many other shrubs might also have been included in this planting, but because of insufficient land available for this purpose they have been omitted. In a few places two hedges have been planted in the same twenty-five-foot row. For instance, the red-leaved Japanese barberry is similar to the typical form of that species in every respect but the color of the foliage. Consequently $12\frac{1}{2}$ feet of one hedge is made up of Japanese barberry, and the other $12\frac{1}{2}$ feet made up of its red-leaved variety.

In the fall of 1936, when these hedges were planted, most of the deciduous plants were approximately 3 feet high. The evergreens were even smaller. Plants of this size are much easier to transplant than larger ones, and what is even more important, young plants are easily trained into a dense, bushy habit. In the taller growing hedges only seven plants of each variety were used; in the lower growing ones ten plants were used.

All the deciduous plants were cut down to about six inches from the ground as soon as they were transplanted. This is necessary in any young hedge to force the plants to develop a bushy habit and to branch from the base. No pruning was given these hedges during the first year of growth. In the second year all the hedges were carefully inspected and the over-vigorous shoots were cut back, while a small amount of pinching was done on the sides to give the plants a uniform appearance. During the growing season of 1939, many of these hedges will require regular pruning, but for the first few years the object is to keep all hedges as small as possible in order to promote dense, bushy growth from the base.

The evergreen shrubs have not been cut to the ground after planting, but have been inspected several times and occasionally clipped in order to promote a dense growth. Evergreen hedges, being slower growing than deciduous hedges, are considerably more easily cared for, but with both it is equally important to take every opportunity in promoting a dense habit of growth from the beginning.

All the plants (except a few rare ones grown on our grounds) have been given to the Arnold Arboretum for the purpose of growing in a hedge demonstration plot. The following nurseries have very generously contributed this material.

Wyman's Framingham Nurseries, Framingham, Mass.
Bay State Nurseries, North Abington, Mass.
Kelsey-Highlands Nursery, E. Boxford, Mass.
Princeton Nurseries, Princeton, N.J.

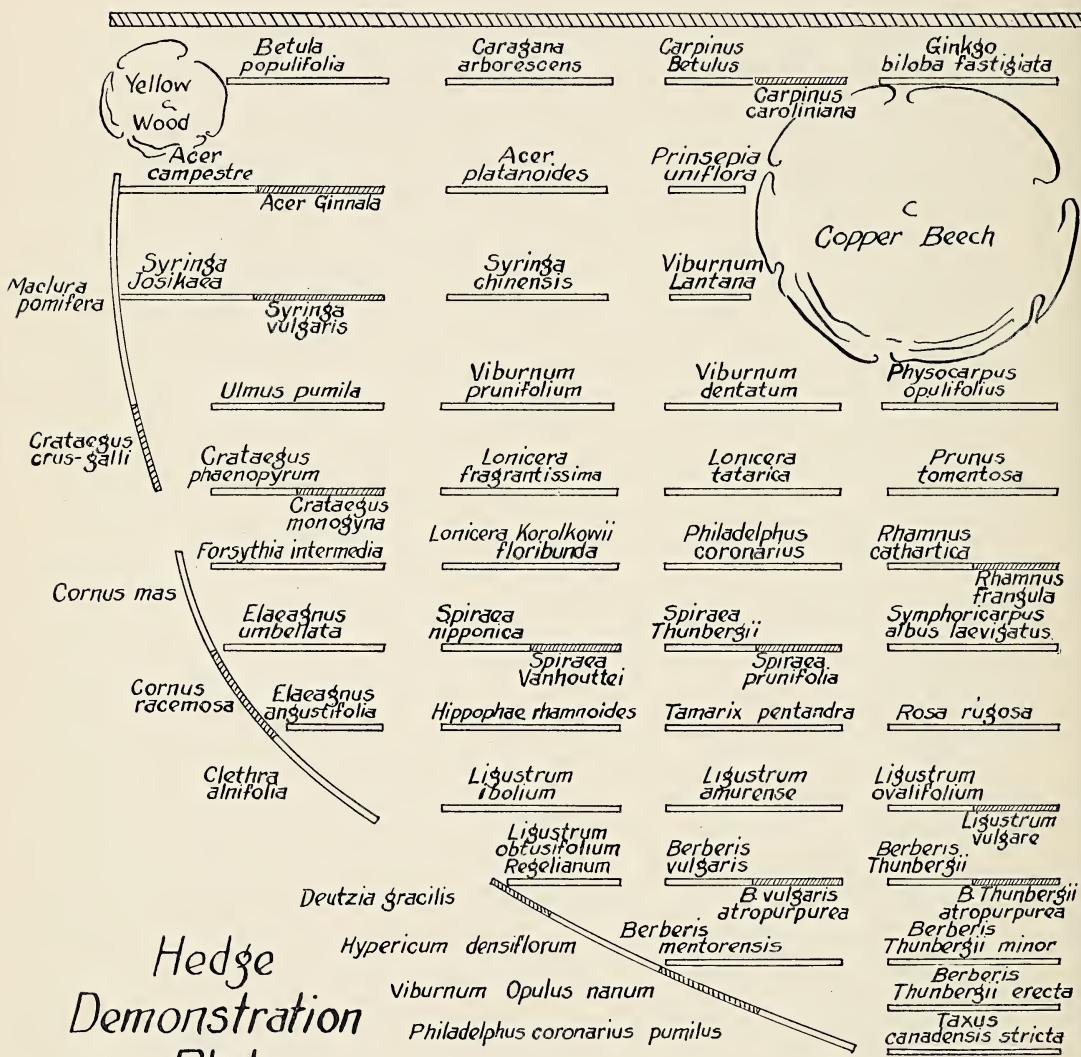
Henry Kohankie & Son, Painesville, Ohio
Cole Nursery Company, Painesville, Ohio
Cherry Hill Nurseries, West Newbury, Mass.
Littlefield-Wyman Nurseries, North Abington, Mass.

The Arboretum takes this opportunity of publicly expressing its appreciation of these gifts. It would have required many years and considerable trouble to propagate and grow these many plants. The generous gift of this material has rendered this experimental plot useful to the public, to nurserymen, and landscape architects in a comparatively short time.

Notes

The Arboretum has done a great deal of hybridizing during the past spring and summer. Approximately 20,000 hand pollinations have been made. These have been distributed among 23 genera including Magnolia, Malus, Prunus, Rhododendron, Viburnum, Salix, Fraxinus, Betula, Pinus, Picea, Abies, and several others. Although it is one thing to pollinate flowers and another to collect the ripened fruit, nevertheless, inspite of hungry birds and the hurricane, quite a few were collected. In addition, a large number of open pollinated seeds were collected from trees and shrubs of particular ornamental value. This work is under the general supervision of Dr. Karl Sax of the Arnold Arboretum. A good proportion of the seed collected this fall will be germinated and later grown in the nurseries where it will be carefully watched and variations in the plants observed and noted. An increased amount of available nursery space will insure its being carried on for a number of years. With approximately 7000 species and varieties of ornamental woody plants growing on its 265 acres, the Arnold Arboretum is unusually well equipped to carry out such a breeding program.

It is particularly pleasing to acknowledge the hundreds of letters which have poured in from all over the country offering assistance or gifts of plants to replace those lost in the Arboretum during the hurricane of September twenty-first. These letters have come from private individuals, institutions, and many nurserymen who have generously offered plants of our own choice. The staff of the Arboretum appreciates the courtesy and interest shown by these people. The work of cleaning the wreckage in the Arboretum is progressing as rapidly as can be expected under the circumstances. There is a certain amount of routine fall work which cannot be neglected. Those areas in which the damage is the most conspicuous from the roads are being cleared as fast as possible. The tedious, time-consuming task of pruning broken branches from otherwise uninjured trees will probably not be started until late in the winter. However, much progress has already been made, and with some assistance from outside the hurricane area we hope to make a splendid showing by spring.



<i>Cercidiphyllum japonicum</i>	<i>Gleditsia triacanthos</i>	<i>Platanus acerifolia</i>	<i>Tilia cordata</i>	
<i>Fagus sylvatica</i>	<i>Fagus grandifolia</i>	<i>Prunus sibirica</i>	<i>Populus alba pyramidalis</i>	<i>Thuja occidentalis</i>
<i>Quercus palustris</i>	<i>Quercus robur fastigiata</i>	<i>Quercus imbricaria</i>	<i>Populus nigra italica</i>	<i>Thuja occidentalis spiralis</i>
<i>Abies concolor</i>	<i>Abies Fraseri</i>	<i>Pseudotsuga taxifolia</i>	<i>Juniperus communis</i>	<i>Thuja occidentalis robusta</i>
<i>Pinus Strobus</i>	<i>Pinus sylvestris</i>	<i>Pinus nigra</i>	<i>Juniperus virginiana</i>	
<i>Tsuga canadensis</i>	<i>Tsuga caroliniana</i>	<i>Thuja plicata</i>	<i>Chamaecyparis pisifera plumosa</i>	
<i>Picea Abies</i>	<i>Picea pungens glauca</i>	<i>Picea Omorika</i>	<i>Picea orientalis</i>	<i>Caragana frutex</i>
<i>Chamaecyparis pisifera filifera</i>	<i>Chamaecyparis pisifera squarrosa</i>	<i>Pinus Mugo mughus</i>	<i>Pinus Mugo mughus</i>	<i>Rosa virginiana</i>
<i>Thuja occidentalis Wagneriana</i>	<i>Ribes alpinum</i>	<i>Taxus cuspidata</i>		<i>Chaenomeles lagenaria</i>
<i>Thuja occidentalis Woodwardii</i>	<i>Thuja occidentalis globosa</i>	<i>Taxus cuspidata capitata</i>		
<i>Euonymus alata compacta</i>	<i>Acanthopanax Sieboldianus</i>		<i>Taxus media Hatfieldii</i>	
<i>Buxus microphylla koreana</i>	<i>Thuja occidentalis "Little Gem"</i>		<i>Taxus media Hicksii</i>	
<i>B. m. koreana hybrid</i>		<i>Taxus media hedge form</i>		
<i>Taxus cuspidata nana</i>				

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HEDGE DEMONSTRATION PLOT

Arnold Arboretum

November, 1938

Deciduous

<i>Acanthopanax Sieboldianus</i>		Fiveleaf Aralia
<i>Acer campestre</i>		Hedge Maple
" <i>Ginnala</i>		Amur Maple
" <i>platanoides</i>		Norway Maple
<i>Berberis mentorensis</i>		Mentor Barberry
" <i>Thunbergii</i>		Japanese Barberry
" " <i>atropurpurea</i>		Red-leaved Japanese Barberry
" " <i>erecta</i>		Truehedge Columnberry
" " <i>minor</i>		Box Barberry
" <i>vulgaris</i>		European Barberry
" " <i>atropurpurea</i>		Purple Barberry
<i>Betula populifolia</i>		Gray Birch
<i>Caragana arborescens</i>		Siberian Pea-tree
" <i>frutex</i>		Russian Pea-shrub
<i>Carpinus Betulus</i>		European Hornbeam
" <i>caroliniana</i>		American Hornbeam
<i>Cercidiphyllum japonicum</i>		Katsura-tree
<i>Chaenomeles lagenaria</i>		Flowering Quince
<i>Clethra alnifolia</i>		Summersweet
<i>Cornus mas</i>		Cornelian-cherry
" <i>racemosa</i>		Gray Dogwood
<i>Crataegus crus-galli</i>		Cockspur Thorn
" <i>monogyna</i>		English Hawthorn
" <i>phaenopyrum</i>		Washington Hawthorn
<i>Deutzia gracilis</i>		Slender Deutzia
<i>Elaeagnus angustifolia</i>		Russian-olive
" <i>umbellata</i>		Autumn Elaeagnus
<i>Evonymus alata compacta</i>		Dwarf Winged Evonymus
<i>Fagus grandifolia</i>		American Beech
" <i>sylvatica</i>		European Beech
<i>Forsythia intermedia</i>		Border Forsythia
<i>Ginkgo biloba fastigiata</i>		Upright Ginkgo
<i>Gleditsia triacanthos</i>		Common Honeylocust
<i>Hippophae rhamnoides</i>		Common Sea-buckthorn
<i>Hypericum densiflorum</i>		

<i>Ligustrum amurense</i>	Amur Privet
" <i>ibolium</i>	<i>Ibolum</i> Privet
" <i>obtusifolium</i> <i>Regelianum</i>	<i>Regel</i> Privet
" <i>ovalifolium</i>	California Privet
" <i>vulgare</i>	European Privet
<i>Lonicera fragrantissima</i>	Winter Honeysuckle
" <i>Korolkowii</i> <i>floribunda</i>	Broad Blueleaf Honeysuckle
" <i>tatarica</i>	Tatarian Honeysuckle
<i>Maclura pomifera</i>	Osage-orange
<i>Philadelphus coronarius</i>	Sweet Mockorange
" " <i>pumilus</i>	Dwarf Sweet Mockorange
<i>Physocarpus opulifolius</i>	Ninebark
<i>Platanus acerifolia</i>	London Planetree
<i>Populus alba pyramidalis</i>	Bolleana Poplar
" <i>nigra</i> <i>italica</i>	Lombardy Poplar
<i>Prinsepia sinensis</i>	Cherry Prinsepia
" <i>uniflora</i>	White Prinsepia
<i>Prunus tomentosa</i>	Nanking Cherry
<i>Quercus imbricaria</i>	Shingle Oak
" <i>palustris</i>	Pin Oak
" <i>robor</i> <i>fastigiata</i>	Pyramidal English Oak
<i>Rhamnus cathartica</i>	Common Buckthorn
" <i>Frangula</i>	Glossy Buckthorn
<i>Ribes alpinum</i>	Mountain Currant
<i>Rosa rugosa</i>	Rugosa Rose
" <i>virginiana</i>	Virginia Rose
<i>Salix pentandra</i>	Laurel Willow
" <i>purpurea</i>	Purple Osier
<i>Spiraea nipponica</i>	Nippon Spirea
" <i>prunifolia</i>	Bridalwreath
" <i>Thunbergii</i>	Thunberg Spirea
" <i>Vanhouttei</i>	Vanhoutte Spirea
<i>Symporicarpus albus laevigatus</i>	Common Snowberry
<i>Syringa chinensis</i>	Chinese Lilac
" <i>Josikaea</i>	Hungarian Lilac
" <i>vulgaris</i>	Common Lilac
<i>Tamarix pentandra</i>	Fivestamen Tamarix
<i>Tilia cordata</i>	Littleleaf European Linden
<i>Ulmus pumila</i>	Dwarf Asiatic Elm
<i>Viburnum dentatum</i>	Arrowwood
" <i>Lantana</i>	Wayfaring-tree
<i>Viburnum Opulus nanum</i>	Dwarf Cranberrybush
" <i>prunifolium</i>	Blackhaw

Evergreen

<i>Abies concolor</i>		White Fir
" <i>Fraseri</i>		Fraser Fir
<i>Buxus microphylla koreana</i>		Korean Box
" " " <i>hybrid</i>		
<i>Chamaecyparis pisifera filifera</i>		Thread Retinospora
" " <i>plumosa</i>		Plume Retinospora
" " <i>squarrosa</i>		Moss Retinospora
<i>Juniperus communis</i>		Common Juniper
" <i>virginiana</i>		Redcedar
<i>Picea Abies</i>		Norway Spruce
" <i>Omorika</i>		Serbian Spruce
" <i>orientalis</i>		Oriental Spruce
" <i>pungens glauca</i>		Blue Colorado Spruce
<i>Pinus Mugo</i>		Swiss Mountain Pine
" " <i>mughus</i>		Mugho Pine
" <i>nigra</i>		Austrian Pine
" <i>Strobus</i>		White Pine
" <i>sylvestris</i>		Scotch Pine
<i>Pseudotsuga taxifolia</i>		Douglas-fir
<i>Taxus canadensis stricta</i>		Dwarf Hedge Yew
" <i>cuspidata</i>		Japanese Yew
" " <i>capitata</i>		
" " <i>nana</i>		
" <i>media</i> (hedge form)		
" " <i>Hicksii</i>		Hicks Yew
" " <i>Hatfieldii</i>		Hatfield Yew
<i>Thuja occidentalis</i>		American Arborvitae
" " <i>globosa</i>		American Globe Arborvitae
" " "Little Gem"		Little Gem Arborvitae
" " <i>robusta</i>		Ware's Arborvitae
" " <i>spiralis</i>		
" " <i>Wagneriana</i>		
" " <i>Woodwardii</i>		Woodward Arborvitae
" <i>plicata</i>		Giant Arborvitae
<i>Tsuga canadensis</i>		Canada Hemlock
" <i>caroliniana</i>		Carolina Hemlock